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THE PHILIPPINE
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NOTES ON PHILIPPINE ALCYONARIA

PART III: TWO NEW SPECIES OF LITHOPHYTUM FORSKÅL FROM THE PHILIPPINES [1]

By S. F. LIGHT

(From the Zoölogical Laboratory, College of Liberal Arts, University of the Philippines)

TWO PLATES AND 3 TEXT FIGURES

The history of the genus *Lithophytum* Forskål, formerly *Ammothea* Savigny, has been well treated by Kükenthal (1903) in his revision of the Nephthyidæ, and by Shann (1912). In his revision Kükenthal included in the genus several species which in his latest work (1913) he has transferred to the genera *Lemnalia* and *Paralemnalia*. He there defines the genus *Lithophytum* as follows:

> Die weichen und biegsamen Kolonien sind strauchartig oder baumartig aufgebaut. Stets findet eine Verzweigung der Hauptstämme statt. Die Polypen stehen stets in "Kätzchen" oder "Läppchen." Ein Stützbündel fehlt, die Polypen sind nicht retraktil. Die dünnen Kanalwände enthalten spärlich spindelförmige Spicula, die auch fehlen können. Die Polypenspicula, die ebenfalls fehlen können, sind bedornte Spindeln, deren Dornen aber nicht zu Kränzen zusammentreten. Verbreitung: Indopazifischer Ozean, in flachem Wasser, auf Korallenriffen.

He recognizes 12 species belonging to the genus as thus diagnosed. One of these, *Lithophytum acutifolium*, is a new species from the Red Sea related to *L. stuhlmanni* (May). Two other species have been proposed by Thomson and Henderson (1906 and 1909). Their *L. macrospiculatum* is a species of *Nephthya*, for as Kükenthal (1913) has noted the descriptions and figures of the authors show, very plainly, the presence of a "Stütz-

[1] For the preceding articles of this series see *This Journal, Sec. D* (1913), **8**, 435, and (1914), **9**, 233.

bündel." Their very short description of *L. indicum* and the lack of figures of any kind make it impossible to determine definitely just where it belongs. The large single polyps without a Stützbündel and the fact that the specimen came from a depth of 400 fathoms suggest the genus *Eunephthya*. No hint is given in the description, however, as to the consistency of the colony, the spiculation of the canal walls, or the comparative size and arrangement of the canals. For these reasons it would be practically impossible to diagnose any alcyonarian as belonging to this species. It would be interesting, in the light of their descriptions of these two species, to know just what Thomson and Henderson consider to be the distinguishing characters of the genus *Lithophytum*.

The zoölogical collection of the University of the Philippines contains a large number of specimens of shallow-reef Nephthyidæ. These include among others one or two species of *Dendronephthya*,[2] 3 species and 3 varieties of *Capnella* (Light, 1914), a number of species of *Lemnalia*, and the common *Paralemnalia thrysoides* (Ehrbg.) Kükenthal (1913). The remainder and by far the greater number of specimens belong to the genera *Nephthya* and *Lithophytum*. The majority of these show the heavy spiculation, the leathery cortex, the rather stiff colony, and the Stützbündel of *Nephthya*. A few specimens, belonging to the 2 species described in this paper, have the characters of *Lithophytum:* the light spiculation of the cortex, the soft flaccid colony, the canal walls with few spicules, and the polyp with few spicules and without a Stützbündel. In the 2 species of this type in our collection there are no polyp or branch spicules. Between these groups, however, are many forms with more or less intergrading characters. They range from forms which have the characters of *Nephthya*, but show a short indistinct Stützbündel, through forms which in other characters agree to a greater or less extent with *Lithophytum* but which have an unmistakable Stützbündel, to those forms which have all the other characters of *Lithophytum* but have on the abaxial surface of some or all the polyps one or more larger, longitudinally arranged spindle-shaped spicules, which we must consider a Stützbündel. While some of these specimens are, to all appearances, more nearly related to *Lithophytum* than to *Nephthya*, yet in order to prevent the possibility of a return to the chaotic condition which has existed in the past with regard to the

[2] Our large collection of Philippine *Dendronephthya* and *Nephthya* has been sent to Dr. W. Kükenthal at Breslau.

species of these two genera it is necessary to adhere strictly to the generic definition, which makes it impossible for any species having a Stützbündel to belong to the genus *Lithophytum*. Further a colony must be considered as having Stützbündel if any of its polyps show on their abaxial surfaces an arrangement of one or more spicules, usually larger than those of the rest of the polyp, in the form of a median longitudinal bundle, which may or may not project beyond the surface of the polyp. The reason for this will be clear to anyone who has studied the stormy history of the genus *Ammothea*, now *Lithophytum*, and of the genera *Nephthya* and *Dendronephthya* (formerly *Spongodes*) and has seen the almost endless variety of intergrading forms. Any definition of a Stützbündel which leaves it to the opinion of the individual as to just when such a spicule arrangement becomes a "Stützbündel" will lead to confusion in determining whether or not one of these forms belongs to *Nephthya* or to *Lithophytum*. This matter has been admirably summed up by Shann (1912).

While it is necessary for the reasons given above and in view of our present knowledge—or rather lack of knowledge—of the finer structure of the species of these genera to adhere, for the present at least, to what seems to be an artificial division of the species, it is to be earnestly hoped that other and more natural generic characters may be found on which the separation of the species of *Nephthya* and *Lithophytum* may be based.

Until the present time no species of *Lithophytum* has been reported from the Philippines. This is another instance of the lack of knowledge of the Philippine *Alcyonaria* and particularly of the reef forms, which is so strikingly apparent in a review of the literature of the subject. The only extensive collection of Philippine *Alcyonaria* which has been reported on is the one made by the *Challenger*, and that is surprisingly lacking in reef forms. The collection made by the *Albatross* in Philippine waters from 1908 to 1910 has not been reported, but it is very unlikely that it will contain any large number of reef forms. It is not surprising, therefore, that the two species of *Lithophytum* in our collection are new to science.

Lithophytum philippinensis sp. nov. Plate I and text figure 1.

The very long, flaccid, bushy or treelike colony, which reaches a height of from 200 to 300 millimeters, arises from a narrow base. The longitudinal lines marking the lines of junction of the outer canal walls and the stem cortex are especially distinct in the branches where the cortex is transparent. The colony

may consist of a main stem, from which arise throughout its length numerous long branches, or it may consist of a number of stems arising from or near the base. The slender lateral and terminal lobes which are borne on the primary or secondary divisions of the main branches are cone-shaped in contracted specimens and nearly cylindrical in expanded colonies. They vary greatly in size and arrangement, reaching a length of about 20 millimeters in expanded specimens. The polyps are arranged singly or in little groups on the lobes and are not crowded in expanded specimens. They are from 0.6 to 1 millimeter in length and from 0.5 to 0.7 millimeter in diameter. The short thick tentacles make a right angle with the oral surface in expanded polyps and give them a flowerlike appearance. The tentacles average 0.4 millimeter in length and 0.15 millimeter in width and bear on either side from 6 to 8 short, thick,

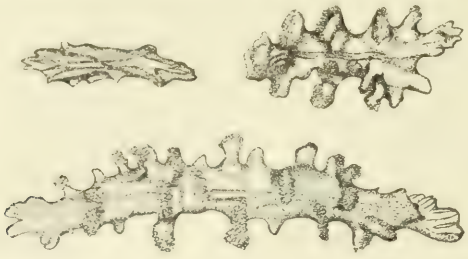

FIG. 1. Spicules from the stem cortex of *Lithophytum philippinensis* sp. nov. × 112.5.

rounded pinnules. The contracted polyps are club-shaped, and the tentacles are folded in over the edges of the oral surface, leaving a hollow in the center.

The spicules of the stem cortex are straight or slightly curved, opaque white spindles covered with large, blunt, smooth or tuberculated projections flattened in the line of the short axis of the spicule. These spicules form a scattered layer on the base and the stem, being absent in the branch cortex and in the polyps. They show a dark central axis and are from 0.2 to 0.45 millimeter in length and from 0.025 to 0.04 millimeter in diameter. Scattered among these spindles are smaller, smoother, rod-shaped spicules with a few conical projections. The ends of all the spicules are more or less flattened and divided and receive branches from the central axis.

The canals are numerous with very thin walls containing few, if any, spicules. They radiate from the center where their walls are fused and thickened to form a small central axis containing

a few large spindles covered with small projections. These average 0.8 millimeter in length and 0.08 millimeter in diameter.

The endoderm of the entire colony contains large numbers of zoöxanthellæ to which the color of the colony is due.

In life the stem was light yellow or brown and the polypary greenish brown to green. These colors gradually fade out in formalin, leaving the stem white and the polypary yellow.

Locality.—Collected by Day in Little Baleteros Cove, Port Galera, Mindoro, and by Light from Port Galera Bay, Mindoro, and from Taytay Bay, Palawan, in from 1 to 3 meters on the shallow reefs.

Type.—No. C. 246 in the zoölogical collection of the University of the Philippines.

Systematic position.—In colony form this species is most like *L. acutifolium* Kükenthal (1913), and in spiculation it is most like *L. ramosum* (Q. and G.). It differs from all other species of *Lithophytum* with the exception of *L. ramosum* and *L. stuhlmanni* (May) in that there are no spicules in the polyps and the cortex of the distal portion of the colony. The position and number of the lobes, the scarcity of the canal-wall spicules, and the fact that the spicules are all spindles and found only in the center of the stem effectually differentiate it from *L. ramosum*. From *L. stuhlmanni* it differs, among other things, in that its spicules are spindles only, while in *L. stuhlmanni* they are irregular forms, double stars, etc.

I have 9 colonies of this form from the two widely separated habitats, all of which agree very closely with the description given above. As it is the most widely distributed form on the Philippine reefs, I have given it the specific name *philippinensis*.

Lithophytum rigidum sp. nov. Plate II and text figures 2 and 3.

The rather short, bushy colony consists of a number of cylindrical stems which arise from a narrow base and extend laterally and distally, reaching a length of from 75 to 100 millimeters. These stems have a swollen fleshy appearance and a stiffness which keeps them in position. They are smooth in appearance, being covered in their middle and lower portions with a thin layer of numerous small spindles, but having no spicules in their upper portions nor on the branches, twigs, or polyps. The longitudinal line marking the points of junction of the outer canals and the stem cortex are very distinct in the upper portion of the colony, but are somewhat obscured by the spicules below. The branching is irregular. A few of the stems give off one or two short branches near the base, and most of

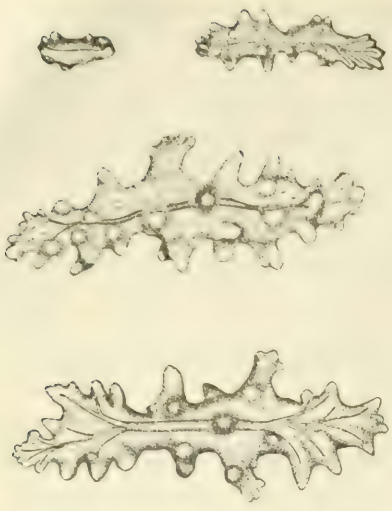

FIG. 2. Spicules from the stem cortex of *Lithophytum rigidum* sp. nov. × 112.5.

them divide in their distal portion into two or three short, distally directed, main branches. These branches divide to form a number of lateral branches and one terminal branch, which bear the distally directed, single or compound, polyp-bearing catkins. In an expanded colony the catkins are about 9 millimeters in length, and taper from a basal diameter of 3.5 millimeters to a blunt point.

The polyps which are tubular or club-shaped are from 0.4 to 0.7 millimeter in diameter just below the tentacles and from 0.5 to 0.8 millimeter in length. When contracted, the tentacles are folded in around the edge of the oral surface, leaving a hollow in the center. When in a resting condition the tentacles extend in the direction of the long axis of the polyp, and when expanded they make a right angle with the long axis of the polyp. The tentacles are short and broad and give the expanded polyp a flowerlike appearance. There is a single row of from 6 to 8 short, thick, rounded pinnules on each side of each tentacle. The polyps arise close together on the catkins, singly or in little clumps, or in broken oblique whorls.

The endoderm of the entire colony from the base to the tips of the pinnules contains many small unicellular algæ, which appear under the microscope as tiny transparent or greenish spheres and which give the colony its peculiar greenish color in life.

The spicules of the stem cortex are straight or slightly curved spindles covered with large somewhat irregular projections. The spindles are from 0.15 to 0.4 millimeter in length and from

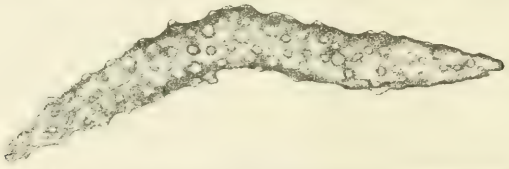

FIG. 3. A spindle from the canal wall of *Lithophytum rigidum* sp. nov. × 47.3.

0.02 to 0.04 millimeter in diameter in the cortex of the midstem and average about 0.3 millimeter in length. They have a distinct central axis which extends into the projections. The projections, which are bluntly conical or flattened in the line of the short axis of the spicule, reach a length at the center of the spicule of 0.025 millimeter and are usually flattened or divided in that region. The ends of these spicules are irregular and usually flattened and divided. Scattered among these larger spicules are a few small rod-shaped spicules bearing a few broadly cone-shaped projections near each end. These spicules average 0.07 millimeter in length and 0.01 millimeter in diameter.

The canals of the stem radiate from the center, where there is a small central cavity between their converging walls. The larger canals are usually found near the center, and the peripheral canals are usually small. Those portions of the walls of the inner canals which lie near the center of the stem contain a few large slightly curved spindles and an occasional triradiate form covered with small closely crowded projections. The spindles reach a length of 0.8 millimeter and a diameter of 0.1 millimeter.

In life the entire colony is green shading into light yellow on the stem and base. In formalin the green fades, leaving the polyp-bearing portion light yellow and the stems white.

Locality.—Collected by Light from the shallow reefs in Taytay Bay, Palawan.

Type.—No. C. 2097 in the zoölogical collection of the University of the Philippines.

This species agrees very closely with *L. philippinensis* in the size and shape of the spicules and in their distribution. The spicules are much more numerous in *L. rigidum,* however, than in *L. philippinensis. Lithophytum rigidum* differs from *L. philippinensis,* also, in that its polyps are consistently smaller and in the form and consistency of the colony. This is not a difference due to contraction as might be supposed, for I have had the opportunity of observing and collecting the living colonies of the two species and the difference is even more striking there than in the preserved material. The much longer and very flexible colonies of *L. philippinensis* are treelike with long slender branches and twigs, the whole colony waving with every current of water, while the colony of *L. rigidum* is short, bushy, and stiff, maintaining a fixed position; its stem and branches are short, thick, and plumply rounded and the polyp-bearing portion is mainly confined to the distal region of the colony.

Had I seen but a single preserved colony of *L. rigidum*, I should probably have felt it necessary to consider it a variety of *L. philippinensis*, but I have a considerable series of specimens of each species, the individuals of which show characteristic and consistent differences and do not intergrade, and as I have seen the living colonies side by side where the differences are more marked it seems necessary to consider *L. rigidum* and *L. philippinensis* to be distinct but closely related species of the genus *Lithophytum*.

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ILLUSTRATIONS

PLATE I. *Lithophytum philippinensis* sp. nov. × ½.
II. *Lithophytum rigidum* sp. nov. × 1.

TEXT FIGURES

FIG. 1. Spicules from the stem cortex of *Lithophytum philippinensis*. × 112.5.
2. Spicules from the stem cortex of *Lithophytum rigidum*. × 112.5.
3. A spindle from the canal wall of *Lithophytum rigidum*. × 47.3.

PLATE I. LITHOPHYTUM PHILIPPINENSIS SP. NOV.

PLATE II. LITHOPHYTUM RIGIDUM SP. NOV.

THE HABITS OF SOME TROPICAL CRUSTACEA: II

By R. P. Cowles

(From the Department of Zoölogy, College of Liberal Arts, University of the Philippines)

THREE PLATES AND 2 TEXT FIGURES

FEEDING HABITS OF ATYA MOLLUCCENSIS AND CARIDINA SPECIES

At least one species of the genus *Atya* and several species of the genus *Caridina* are found in the fresh-water streams of the Philippine Islands, but these crustaceans are of almost no commercial value, although they are sometimes eaten when food is very scarce. Their habits, however, are very interesting, and I consider it worth while to publish my observations along this line, especially since the accounts published for other species are somewhat at variance.

Both genera are characterized by the possession of remarkable chelæ (pincers) on the first and second legs, and to these structures various functions have been ascribed. The peculiarly shaped chelæ are provided with dense groups of hairs, which when the chelæ are closed remind one of a wet camel's hair brush from which the excess water has been pressed so that the tip is pointed. Some observers of *Atya* have seen these brushes, when the fingers were open, spread out into the form of a fan under which condition they acted as a sieve to catch minute organisms. On the closure of the fingers the fan was seen to assume the form of a brush, closing around the food and compressing it into a pellet, which was passed to the mouth with great rapidity. Also it has been stated that members of the family Atyidæ use the brushes in sweeping up minute particles of food from the mud, and one observer states that the chelæ are used for digging burrows. Finally, it has been suggested that it is highly probable that all species of the family Atyidæ use the bunches of hairs in the form of fanlike sieves for food gatherers as described above.

I have had the opportunity of collecting atyas from a mountain stream near Manila and caridinas from streams in different parts of the Philippine Islands. Also I have observed the feeding habits of atyas in aquaria and of caridinas both in their natural habitat and in captivity. All the species of *Caridina*

and *Atya* that I have observed use the first and second legs as feeding organs, but in the two genera they are used in a different manner, and this difference seems to be correlated to some extent with their difference in habitat.

Atya molluccensis de Haan, which is the only species of this genus I have collected in the Philippines, is found in abundance in mountain streams several hundred feet above the sea level, but an occasional specimen is sometimes seen in the streams of the lowlands. Individuals of this species and probably of other species of the genus are found clinging to roots, twigs, grass, etc., in their natural habitat, and this tendency is one of their striking characteristics. In aquaria supplied with running water they show the same tendency, and it is almost as marked in still water. They crawl rapidly when taken out of water, but even the same clinging habit is seen when a suitable object presents itself. The animal seems to be uneasy when there is

FIG. 1. *Atya molluccensis* de Haan. Left first leg, outer aspect. × 3.5.

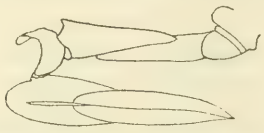


FIG. 2. *Atya molluccensis* de Haan. Left first leg, outer aspect, showing chela turned backward for application to the mouth. × 3.5.

nothing to hold on to, but this uneasiness disappears, even when the atya is removed from water, if it is so placed that it can cling to a finger or to anything of similar shape. In general, *Atya molluccensis* lives in rather swiftly moving, shaded streams where it is necessary for it to cling to roots, etc., in order to prevent its being swept away. As a rule it does not seem to spend much of its time crawling on the bottom and probably does not feed in the mud. I have kept this species in an aquarium with and without a mud bottom and in both cases with and without running water, for many months. Never have I seen a specimen feeding in the mud or sweeping organisms off of water plants. In still water they either attach themselves to some root or twig or search for a hole or crevice to protect themselves and remain still without feeding. In a running-water aquarium, however, they find the entering point of the water, seek an object to cling to, and arrange their bodies so as to head upstream. When settled in this position, they are undoubtedly under conditions very similar to those of their natural

habitat. Then begins the interesting process of feeding which was first described by Fritz Müller[1] for *Atyoida potimirim*[2] (now known as *Atya potimirim*).

The method as observed by me is as follows: Usually, as soon as the atya becomes settled, the first and second pairs of legs are extended anteriorly, the chelæ—4 in all—open, and the brushes of hairs spread out so as to make wide open, almost funnel-shaped strainers, whose larger open ends are directed toward the stream. Each chela has 2 strainers, making 8 strainers in all. When a pair of strainers has collected enough food, the chela is closed, the hairs become grouped into a single brush, the chela turns backward on its basal end as an axis through almost 180°, and finally the brush of hairs is applied to the mouth where the food is extracted. The maneuver last described is executed very quickly, in less than half a second, and when it is completed the chela returns to its former position and opens and the strainer begins to perform its function again. The other strainers when filled are handled in the same way.

There seems to be no regularity in the order in which the chelæ are brought to the mouth, it depends apparently upon the rapidity with which the strainers collect the food. A microscopic examination of the hairs of the strainers shows that each has finer hairs growing from it and they probably interlace, thus increasing the collecting power of the strainers. In conclusion, then, *Atya molluccensis* is, primarily at least, a feeder on small organisms or other finer particles of food which are floating in the water, and judging from observations of the feeding and other habits of the animal in its natural habitat, it is probable that the method described above is the only one used.

The species of *Caridina* which I have collected have not been identified, but I find that they all have similar habits. They occur in springs, shallow streams, and lakes in the Philippines and like the species of *Atya* are good crawlers.

The first and second legs are somewhat similar to the same structures in the genus *Atya*, except that the chelæ have a different form and the hairs are shorter and less numerous. In all my observations of these crustaceans, both in the field and in captivity, I have never seen the hairs spread out to form a strainer, nor have I seen these animals taking advantage of the

[1] *Kosmos*. Stuttgart (1881), 9, 117.

[2] I am much indebted to Dr. W. T. Calman, of the British Museum, for a copy of Müller's paper.

current of water for feeding purposes. If specimens of *Atya* and *Caridina* are put in the same running-water aquarium with mud in the bottom, the difference in the behavior is striking. The specimens of *Atya* seek the current and after attaching themselves to some object remain quiet for long intervals while feeding with their strainers; but the specimens of *Caridina* apparently disregard the current and begin to crawl about actively over the muddy bottom. During this time the latter are engaged in feeding, which consists of slightly opening the brushes of hairs, sweeping them over mud and other objects, and then applying them to the mouth. They are certainly mud-feeders, although they undoubtedly brush many small organisms off of stones and sticks and algæ, grasses, and other plants. When placed in dishes of water with no mud in the bottom, but with a supply of algæ and other water plants, they usually attach themselves to the plants, when hungry, crawling gradually about and sweeping off the organisms, since this is the only place they can obtain their food. I have not observed this method of feeding in the natural habitat; there, the caridinas are usually found on the bottom of the stream feeding according to the first method.

There seems then to be a distinct difference in the feeding habits of the species of *Atya* and *Caridina* found in the Philippines, although the first and second legs in the two genera are quite similar in structure. I have never seen specimens of either genus digging burrows with their first and second legs, nor in fact have I ever seen them make burrows in any way.

HABITS OF MYCTIRIS LONGICARPUS LATREILLE

The interesting genus *Myctiris* contains only 2 well-defined species, *Myctiris longicarpus* Latreille [3] and *Myctiris platycheles* Milne-Edwards,[4] both of which inhabit the islands of the Pacific. Up to the present time only *Myctiris longicarpus* has been taken in the Philippines. The zoölogical department is indebted to Dr. L. E. Griffin for specimens from Bantayan, a small island off the northwest coast of Cebu; to Mr. W. Schultze for specimens from Iwahig, on the eastern coast of Palawan; and to Mr. José Laki for a large collection from Taytay, Palawan, where I have studied the habits of these crustaceans. All of these localities are in the Philippine Islands.

Myctiris longicarpus is not a land crab. It is never seen at

[3] Milne-Edwards, Histoire Naturelle des Crustacés (1837), 2, 37.
[4] *Ann. Sci. Nat.* (1852), 18, 154.

Taytay along the beach in such regions as are inhabited by *Ocypoda*. In fact I have never seen *Myctiris longicarpus* except at low tide, and then only at a considerable distance seaward from the high-tide mark on exposed sand flats. When the tide is low and the sand flats are uncovered, this *Myctiris* makes its appearance in bands of almost countless individuals. They move about like diminutive armies, reminding one somewhat of the habits of certain species of fiddler crabs, but as soon as the tide begins to flood they disappear, and I have never been able to see them on the bottom, even with the aid of a water glass, until the sand flats became exposed again.

While *Myctiris longicarpus* is quite inconspicuous at a distance of from 12 to 15 meters, it is very striking in appearance at close range. The body, which is almost spherical in shape and grayish blue in color, is of about the size of a large cherry. The light-colored legs, including the chelipeds, are set rather close to the body and are curved to conform with the spherical shape of the animal.

If one is fortunate enough to get close to a group of these crabs, it is seen that while the individuals seem to be scrambling along in a rather awkward and aimless manner, they all are headed in the same general direction and are moving forward as a unit. Sometimes, however, the group becomes separated into two, after which each group may move in a different direction.

So far as I have been able to make out, these crustaceans do not eat either dead or live crabs or fish. During their migrations over the sand flats they are continually scooping up sand with their chelipeds and smearing it over the mouth parts. Undoubtedly the latter manipulate the sand so as to extract the food, and it is highly probable that *Myctiris* lives on the minute organisms and possibly minute pieces of decaying matter found on the surface of the sand flats.

The most remarkable part of the behavior of *Myctiris* is the rapidity with which it disappears when disturbed. An observer may approach sometimes within from 6 to 10 meters of a group of individuals (Plate II, fig. 1), when suddenly they seem to sink into the sand. The disappearance seldom takes more than two or three seconds and even by running one usually fails to reach the group before it has disappeared. Occasionally, however, when the sun is obscured and the approach is made carefully and slowly, the observer may get close enough to watch the migration and feeding. Then if a quick movement is made or

the sand is sharply stamped with the foot the disappearance begins. Almost simultaneously each individual ceases feeding and begins to dig with the legs of one side at the same time rotating so that the digging follows a spiral. The result is that a circular mound covering the crab is soon thrown up which usually has a small hole in the center of it, but this hole is quickly closed by wet sand pushed up from below (Plate III, figs. 1 to 3). As all of this is done within two or three seconds, it is evident that they work very rapidly. The individuals of a group of feeding crabs are usually packed together so that they touch one another, and since they dig down where they are when they stop feeding the circular mounds interfere with one another, producing a large patch of disturbed sand in which the individual mounds are almost indistinguishable (Plate II, fig. 2). These patches of turned up sand are often very conspicuous when surrounded by the smooth surface of sand left by the receding tide. If the observer waits for a few minutes without moving, a few individuals of the sunken group make their appearance by digging themselves out along the line of a spiral and moving away to form a little group of their own or joining large groups some distance away. More little groups from the buried army appear at intervals and do the same or join with one another. In Plate II, fig. 3, is seen a vertical section made through the mound of a single individual and it shows the little spherical cavity which the myctiris makes after it gets below the surface. I was unable to determine whether or not this cavity filled with air really remains in the natural habitat after the tide has risen and covered the sand flat, but judging from the results obtained in attempting to reproduce such a condition in the laboratory it seems possible. Several specimens of *Myctiris* were placed in a receptacle half-filled with wet sand taken from the sand flats. After they had dug down and had been allowed enough time to make cavities, the receptacle was filled with water. Later in the day I dug down in the sand at a place where a crab was supposed to be and in so doing released the crab and a large bubble of air. The latter undoubtedly filled the cavity occupied by the myctiris and was held in place by the firmly packed sand surrounded on all sides by water.

ILLUSTRATIONS

PLATE I

(Drawings by Castro)

FIG. 1. *Caridina* sp. A female with eggs from Sisiman, near Mariveles, Bataan Province, Luzon. × 3.

2. *Atya molluccensis* de Haan. A female without eggs from Sisiman, near Mariveles, Bataan Province, Luzon. December. × 1.5. The spines on the third, fourth, and fifth legs vary in number.

3. *Atya molluccensis* de Haan. A female from Sisiman, Bataan Province, Luzon. Drawn from a living specimen. × 2. *a*, hairs on chelipeds, enlarged. This figure shows the methods of feeding of *Atya* when there is a stream of water.

PLATE II. MYCTIRIS LONGICARPUS LATREILLE

(Photographs by Cowles)

FIG. 1. A band of crabs on a tide flat.

2. A portion of a tide flat, showing piles of sand above the burrows of *Myctiris*.

3. A vertical median section of a burrow.

PLATE III. MYCTIRIS LONGICARPUS LATREILLE

(Photographs by Cowles)

FIG. 1. A crab partly covered with sand.

2. The mound of sand above a hole.

3. The mound of sand above a hole, the entrance completely closed.

4. Dorsal view of *Myctiris*.

5. Front view of *Myctiris*.

TEXT FIGURES

(Drawings by Cowles)

FIG. 1. *Atya molluccensis* de Haan. Left first leg, outer aspect. × 3.5.

2. *Atya molluccensis* de Haan. Left first leg, outer aspect, showing chela turned backward for application to the mouth. × 3.5.

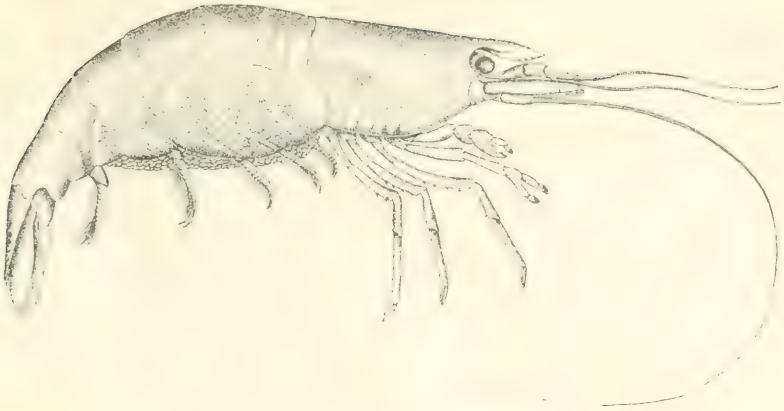


Fig. 1. Caridina sp. A female with eggs.

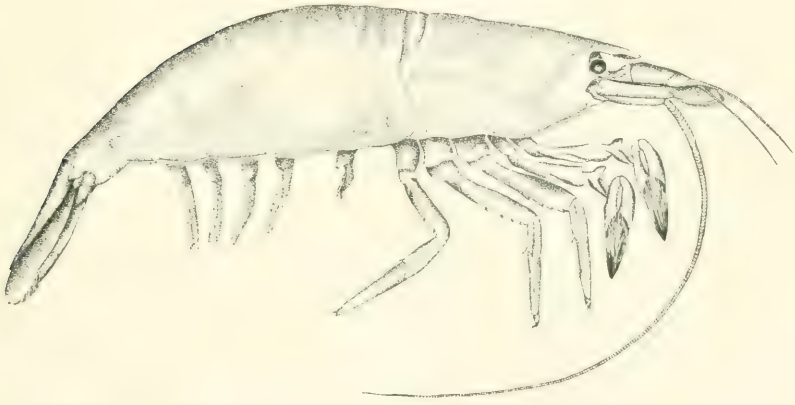


Fig. 2. Atya molluccensis de Haan. A female without eggs.

Fig. 3. Atya molluccensis de Haan. A female. a, hairs on chelipeds, enlarged.

PLATE I.

Fig. 1. A band of crabs on a tide flat.

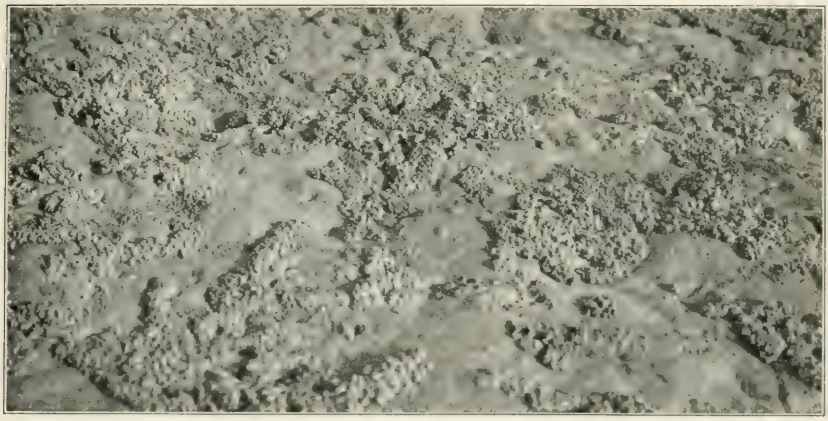


Fig. 2. Piles of sand above the burrows of Myctiris.

Fig. 3. A vertical median section of a burrow.

PLATE II. MYCTIRIS LONGICARPUS LATREILLE.

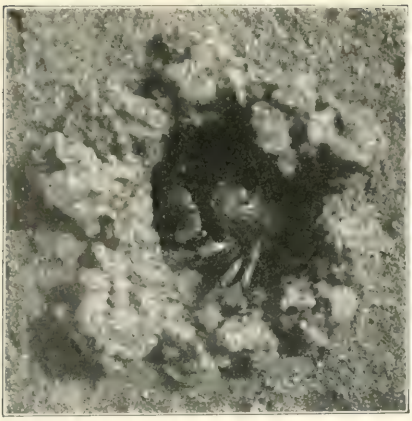


Fig. 1.

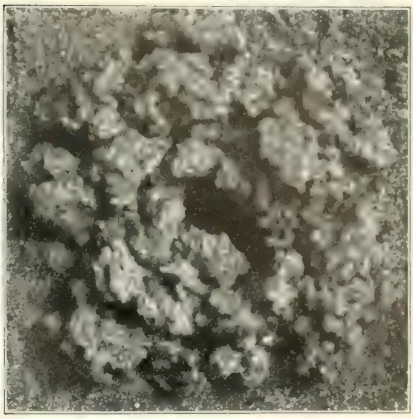


Fig. 2.

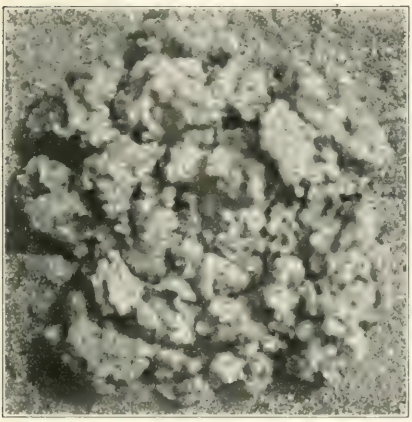


Fig. 3.

Fig. 4.

Fig. 5.

PLATE III. MYCTIRIS LONGICARPUS LATREILLE.

NEUE KÄFER VON DEN PHILIPPINEN: II *

Von K. M. Heller

(Kgl. Zoologisches und Anthropologisch-Ethnographisches Museum, Dresden, Germany)

MIT 12 FIGUREN IM TEXT

Da mir ausser dem Material des Bureau of Science in Manila in gleich dankenswerter und liberaler Weise auch die Sammelergebnisse des Herrn C. F. Baker, Professor für Agronomie an der Universität der Philippinen in Los Baños, zur Verfügung gestellt wurden, bin ich in der Lage einen weiteren Beitrag zu der erwähnten Inselfauna zu geben. Es ist vorläufig nur ein Teil der mir überwiesenen neuen Arten, die hier charakterisiert werden, die übrigen gehören meist kleinen Formen an, die noch eines sorgfältigen Studiums bedürfen; doch hoffe ich, dass in nicht all zu ferner Zeit ein 3. Beitrag wird folgen können. Den erfolgreichen, eifrigen Sammlern sei aber auch an dieser Stelle der Dank für die coleopterologische Erforschung der philippinischen Fauna ausgesprochen, die, allem Anscheine nach, einen grossen, noch zu hebenden Formenreichtum in sich birgt.

Es sind folgende neue Arten, die hier beschrieben werden:

HISTERIDÆ

1. *Trypeticus longicollis.*
2. *Epiechinus lagunæ.*

EUCNEMIDÆ

3. *Semnodema bakeri.*

CURCULIONIDÆ

4. *Styanax luzonicus.*
5. *Nanophyes* (s. str.) *proles.*
6. *Nanophyes neuter.*
7. *Nanophyes discoidalis.*
8. *Nanophyes* (*Corimalia*) *varicolor.*
9. *Apoderus* (*Cyanotrachelus*) *ledyardi.*
10. *Cionus* (*Stereonychus*) *reitteri.*
11. *Endymia apicalis.*
12. *Idotasia paucisquamosa.*
13. *Mecopus bakeri.*
14. *Lobotrachelus gentilis.*
15. *Otidognathus elegans sericoplagia.*
16. *Protocerius rufifrons.*

ANTHRIBIDÆ

17. *Mecocerina guttata jordani.*

* Proof read by W. Schultze and C. F. Baker.

CERAMBYCIDÆ

18. *Epania (?) longicollis.*
19. *Pharsalia truncatipennis.*
20. *Oberea erythrostoma.*
21. *Oberea melanostoma.*
22. *Oberea schadenbergi.*
23. *Oberea quianga.*
24. *Oberea makilingi.*
25. *Oberea flavoterminata.*
26. *Oberea albocuspis.*
27. *Oberea balineæ.*
28. *Oberea punctiventris.*
29. *Oberea micholitzi.*
30. *Oberea mimetica.*

HISTERIDÆ

1. **Trypeticus longicollis** sp. nov. Fig. 1, 1*a*.

Cylindricus, niger, nitidus; fronte planiuscula, elevato-marginata, rostro apice simplici, paulo incurvato, vertice in medio foveolato; prothorace elytris longioribus, sat fortiter, ante densius punctato, linea mediana levi, apice subcarinulata, maxima latitudine ad angulos anticos, sulco laterali ante evanescenti; elytris thoracis basi aequilatis, apice singulis rotundatis, basi oblique truncatis, praesertim apicem versus prothorace subtilius punctatis; propygidio pygidioque rude, hic creberrime punctatis; prosterno irregulariter parceque punctato, sulco laterali ante abbreviato; mesosterno sulcis lateralibus latioribus, parallelis ac plus distantibus; femoribus anticis subter tri-, tibiis anticis quinquedentatis.

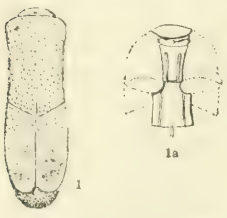


FIG. 1. *Trypeticus longicollis* sp. nov.

Long., 2.8; lat., 0.8 mm.

LUZON, Laguna, Los Baños (*C. F. Baker*).

Cylindrisch, glänzend schwarz, Fühler, Beine und der Seitenrand der Decken in der hinteren Hälfte schwärzlichrotbraun. Stirn in der Mitte kaum merklich eingedrückt, sehr fein, vorn verschwindend punktiert, erhaben umrandet, hinten durch eine gerade Querleiste begrenzt, vorn mit einfacher kaum aufgebogener Spitze, Scheitel zerstreut punktiert, mit grösserem Punktgrübchen in der Mitte. Halsschild länger als die Flügeldecken, an den stumpfen Vorderecken am breitesten, die Seiten leicht konkav, die Mittellinie $1\frac{3}{4}$ mal so lang wie die Basis breit ist, Oberseite kräftig, vorn dichter punktiert, in der Basalhälfte mit undeutlicher glatter Mittellinie, im vorderen Sechstel mit schwacher Medianleiste. Die stumpf verrundeten Vorderecken mit Grübcheneindruck, die Seitenrandfurche kräftig, vorn erlöschend. Flügeldecken so breit wie die Halsschildbasis, die häutig gesäumten Spitzen einzeln abgerundet, überall, aber namentlich nach hinten zu, feiner punktiert als der Halsschild, ein hinter der Schulter beginnender bis zur Deckenhälfte nach hinten reichender breiter Streifen glatt. Propygidium kaum, Pygidium

deutlich gröber und viel dichter punktiert wie der Spitzenteil der Decken. Prosternum vorn und hinten abgestutzt, am Vorderrand etwas breiter als am Hinterrande, mit parallelen im vorderen Viertel abgekürzten Seitenrandfurchen, fein zerstreut punktiert. Mesosternum noch weitläufiger punktiert, mit weiter von einander abstehenden Seitenrandfurchen. Hinterbrust mit Mittelfurche. Abdomen ziemlich kräftig punktiert, Intercoxalfortsatz des ersten Sternites jederseits mit Längsfurche, letztes Abdominalsternit am Basalrand breit glatt. Vorderschenkel unterseits drei–, die Vorderschienen aussen fünf-zähnig.

Mit *T. grouvelli* eine der kleinsten Arten der Gattung und durch den langen, vorn verbreiterten Halsschild und die einfache Spitze des Rostrums ausgezeichnet.

2. **Epiechinus lagunæ** sp. nov. Fig. 2.

Ex affinitate E. birmani Lewis, niger, rotundatus, seriatim ochraceo-tomentosus; antennis, articulo primo, majore, nigro, excepto, ferrugineis; vertice carinula mediana, fronte carinula laterali antrorsum convergente, apice bifida, ochraceo-setosis; prothorace fortiter punctato, utrinque sulcis duabus, latis, glabris, carinulis tribus, setosis, determinatis; elytris striato-punctatis, punctis ad basin majoribus, sutura spatiisque alternatis, angustioribus, carinulatis ac setosis; prosterno simili ut in E. birmano bicarinato, mesosterno medio haud, ad basin in medio vix, metasterno ad apicem distincte foveolatis; tibiis anticis margine externo subangulato, remote setoso.

Fig. 2. *Epiechinus lagunæ* sp. nov.

Long., 1.7; lat., 1.4 mm.

Luzon, Laguna, Los Baños (*C. F. Baker*).

Matt schwarz, die streifenartig erhabene Naht glänzend, Kopf, Halsschild, an den Seiten und die Flügeldecken mit Reihen von schmutziggelben, aufgerichteten Schuppenbörstchen, Fühler und Tarsan rötlichbraun. Kopf zwischen den Fühlern mit vorn abgekürzter, beborsteter Mittelleiste, unterhalb dieser beiderseits auf der Stirn je eine schräg nach innen gerichtete, vorn gegabelte, ebenso beborstete Leiste. Erstes Glied der Fühler, länglich viereckig, so dick wie die Keule, 3.–6. Glied der Geissel quer, Keule sehr wenig länger als dick. Halsschild mehr als doppelt so breit wie lang, entfernt grob punktiert, beiderseits parallel zum Seitenrande mit 2 breiten, tiefen, glatten Furchen deren äussere an der Spitze nach innen gebogen ist, und die durch feine beborstete Leisten begrenzt sind. Flügeldecken breiter als

lang, ihr Seitenrand zur Aufnahme der Hinterschenkel etwas ausgerandet, mit entfernten an der Basis gröberen, gereihten Punkten, neben der Naht und das 2., 4., 6., 8., und 10. Spatium in der Mitte mit beborsteter Längsleiste. Vorderbrust ähnlich wie bei *E. birmanus*, jederseits mit nach vorn konvergierender Längsleiste. Mittel- und Hinterbrust jedoch von abweichender Bildung, namentlich die Mittelbrust in der Mitte ohne Grübchen (siehe Abbildung).

EUCNEMIDÆ

3. **Semnodema bakeri** sp. nov. Fig. 3.

Ex affinitate *S. aucti* Bonv., nigrum, capite prothoraceque subtiliter parceque griseo- elytris nigro-tomentosis, his lateribus ante medium macula subquadrata alba (calva, inpigmentata); capite creberrime punctato, antice impresso, vertice carinato; antennis articulis 3.–10. flabellatis; prothorace latitudine perpaulo longiore, lateribus parallelis, basi impressionibus quatuor oblongis, ad basin confluentibus, interioribus majoribus, disco impressione oblonga postrorsum lineatim attenuato-producta, utrinque altera rotundata, elytris usque ad medium substriatis, reliquis estriatis, subtilissime punctatis; pedibus nigris, tarsorum articulo ultimo rufo.

FIG. 3. *Semnodema bakeri* sp. nov.

Long., 11; lat., 3 mm.

LUZON, mons Maquiling (*C. F. Baker*).

Aus der Verwandtschaft des *Semnodema auctum* Bonv.,[1] glänzend schwarz, fein und spärlich tomentiert, jede Decke an den Seiten, etwas vor der Mitte, mit einem länglich viereckigen Fleck. Kopf dicht punktiert, Stirn vorn im Apicalwinkel eingedrückt, ohne Scheitel mit kurzer Mittelleiste. Halsschild wenig breiter als die Mittellinie lang ist, etwas vor der Mitte auf der Scheibe mit ovalem, nach hinten furchenartig verlängertem Längseindruck und die Wurzel mit 2 am Grunde zusammenflies-

[1] Fleutiaux erwähnt in den Ann. Soc. Ent. Belg. (1897), 41, 258, ein Exemplar von *S. auctum* Bonv. aus dem k. Mus. Berlin von Sumatra (Deli) mit weissem Lateralfleck der Decken, das er mit einem Stück aus Engano, im Museum in Genua, verglichen hat und von diesem artlich nicht zu unterscheiden vermag und, trotzdem Bonvouloir nichts von weissen Seitenflecken erwähnt schon früher auch als *S. auctum* bestimmt hat. Es läge daher die Vermutung nahe, dass das hier beschriebene *S. bakeri*, mit weissem Lateralfleck, auch dieser Form von *auctum* zuzurechnen ist. Die wesentlichen Sculpturunterschiede, namentlich des Halsschildes, zwingen jedoch zur Annahme einer besonderen Art. Was die geographische Verbreitung der nunmehr bekannten Arten betrifft, so ist sie demnach folgende:

senden Längseindrücken, von denen der innere tiefer und fast bis zur Halsschildmitte verlängert ist, ausserdem fast in einer Querlinie mit dem Discoidaleindruck, nur wenig nach vorn verschoben, je mit einem runden, flachen Eindruck. Flügeldecken nur in der Basalhälfte mit feinen Streifen, überall fein und dicht punktiert, jeder Punkt mit feinem schwarzen Härchen, der weisse Seitenfleck reicht bis zum 4. Längsstreifen nach innen und nahe bis zum Seitenrand nach aussen. Beine schwarz, letztes Tarsenglied dunkel rot.

CURCULIONIDÆ

4. **Styanax**[2] **luzonicus sp. nov.**[3]

Aterrimus, St. anthracino brevior, vertice sulco mediano, manifeste setoso-squamoso; prothorace oblongo, lateribus paulo rotundatis, granoso; scutello subovato; elytris prothorace latioribus, parallelis latitudine sesqui longioribus, seriato-foveatis, foveis lateralibus oblongo-rectangularibus, spatiis granulis, magnitudine diversa, interrupte seriatis; femoribus breviusculis, subter minutissime dentatis, posticis sternito quarto abdominali superantibus.

Long., 11; lat., 4.8 mm.

LUZON, Laguna, mons Maquiling (*C. F. Baker*).

Kleiner wie die von mir in der Ent. Zeitg., Stettin (1908), 135, beschriebene *St. anthracinus*, sowie diese glänzend schwarz, mit parallelseitigen, aber viel kürzeren Flügeldecken. Rüssel grob gekörnelt punktiert, mit kurzer Dorsalleiste und zwischen den Augen mit glänzend glatter Makel, von ungefähr halber Augengrösse. Scheitel mit spärlichen, nach vorn gerichteten, bräunlichroten Borstenschüppchen (bei *St. anthracinus* mit feinen gelblichen Härchen). Halsschild länger als breit, an der Basis gerade abgestutzt und erhaben gerandet, daselbst kaum merklich schmäler als in der Mitte, die ganze Oberseite maul-

Semnodema flabellicorne Bonv., Borneo (Sarawak).
Semnodema harmandi Fleut., Mém. Soc. zool. France (1896), 297, Siam (Lakhon).
Semnodema loriai Fleut., Ann. Mus. Genova (1896), 36, 601; Nordost Neuguinea.
Semnodema auctum Bonv., Malacca, N. O. Sumatra (Deli), Engano.
Semnodema ornatum Fleut., Ann. Soc. ent. Belg. (1897), 41, 259, N. O. Sumatra (Deli).
Semnodema bakeri sp. nov., Philippinen (Luzon).
Semnodema resplendens Fleut., Notes Leyd. Mus. (1896), 18, 156, W. Sumatra (Tapanuli).

[2] Pascoe, *Journ. Linn. Soc.* (1871), 164.
[3] Vergl. die synoptische Arttabelle: *Ent. Zeitg.*, Stettin (1908), 136.

beerartig gekörnt. Schildchen länglich, sowie der Basalrand des Halsschildes mit weisslichen Borsten bedeckt. Flügeldecken $1\frac{1}{2}$ mal so lang wie breit, grubig gereiht punktiert, an den Seiten die Gruben länglich viereckig, breiter als die Spatien, diese mit ungleich grossen, hie und da unterbrochenen Körnerreihen, 2. Spatium nahe der Wurzel mit einem länglichen, gekörntem Höcker und zu Beginn des Deckenabsturzes mit grösseren Körnern, das 4. Spatium weiter hinten mit eben solchen. Deckenspitze ganzrandig. Unterseite spärlich mit gekrümmten, weisslichen Schuppenbörstchen bedeckt. Beine relativ kurz, Hinterschenkel das 4. Bauchsternit kaum überragend, alle Schenkel mit kleinem, spitzem, unter den Borsten verstektem Zahne.

Genus Nanophyes Schönherr

In Wytsmans Genera Insectorum haben die *Nanophyinæ* 1909 von A. Bovie eine Bearbeitung gefunden. In der dort gegebenen Gattungscharakteristik werden die Fühler mit 5-gliederiger Geissel angegeben, obwohl F. Pascoe bereits 1883 in den Ann. Mag. Nat. Hist. V, 12, 94, zwei Arten, eine aus Borneo (*N. finitus*) und eine aus Celebes (*N. concretus*) mit 6-gliederiger Geissel beschrieben hat und diese Arten auch in Bovies Artaufzählung angeführt werden. Sehr auffallend ist ferner, dass von früheren Autoren, wie Schönherr, Lacordaire, Bedel, Redtenbacher und Brisout, ein, wie ebenfalls schon Pascoe erwähnt, auch bei europäischen Arten (*N. siculus, globulus, posticus* etc.) vorkommendes Merkmal unerwähnt geblieben ist; es sind dies die aussergewöhnlich verlängerten Trochanteren, deren Spitze die Schenkel gleichsam angefügt sind. Ob es sich, wie Pascoe annimmt, nur um eine starke Abschnürung der Schenkel handelt, scheint mir noch fraglich.

Die 4 mir von den Philippinen bekannt gewordenen Arten zeigen alle das Merkmal der Schenkelabschnürung und 2 Arten, wie aus der folgenden Übersicht hervorgeht, auch eine 6-gliederige Geissel.

a^1. Klauen in der Basalhälfte verschmolzen.
  b^1. Fühlergeissel mit 5 Gliedern, kürzer als die 3-gliederige Keule.
    c^1. Flügeldecken ganz schwarz ..... **N. proles.**
    c^2. Flügeldecken vorwiegend dunkel rot ..... **N. discoidalis.**
  b^2. Fühlergeissel mit 6 Gliedern ..... **N. neuter.**
a^2. Klauen frei, Geissel mit 6 Gliedern, Keule nicht lose gegliedert.
N. varicolor.

Für die Arten mit freien Klauen ist von Des Gozis die Gattung *Gorimalia* geschaffen worden, so dass demnach *varicolor* dort-

hin zu stellen wäre, wie ich angebe, doch unterscheidet sie sich von ihr durch die Zahl der Geisselglieder.

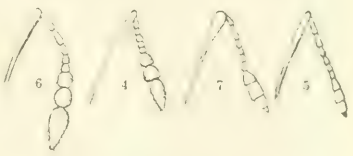
5. **Nanophyes (s. str.) proles** sp. nov. Fig. 4, antenna.

Niger, antennarum scapo trochanteribusque fulvis, prothorace subtilissime, elytris fascia obliqua humerali ad suturae medium currente trienteque parte apicali distinctius griseo-pilosis.

Long., 2; lat., 1.1 mm.

LUZON, Laguna, Los Baños et mons Maquiling (*C. F. Baker*).

Den *N. rufipes* Motsch.[4] sehr ähnlich, aber die Beine mit Ausnahme der langen, gelben Trochanteren ganz schwarz, das letzte Keulenglied länger und mehr zugespitzt. Rüssel $1\frac{1}{2}$ mal so lang wie der Halsschild, beiderseits mit 2 weisslich behaarten Dorsalfurchen, von welchen die innere nur bis zur Rüsselhälfte, die äussere weiter nach vorn reicht und daselbst in Punktreihen aufgelöst ist, Mittellinie leistenförmig. Fühler vor der Mitte des Rüssels eingefügt, der Schaft und das 1. Geisselglied bräunlichgelb, das 2. Geisselglied etwas kürzer als das erste, 4. und 5. kugelig, Keule länger als die Geissel, diese lose gegliedert, ihr 1. und 2. Glied kugelig, das letzte dreimal so lang wie dick, konisch zugespitzt. Halsschild konisch, an der Wurzel deutlich breiter als lang (2:3.6), sehr fein zerstreut punktiert, jeder Punkt mit nach vorn gerichtetem Härchen. Flügeldecken an der Spitze einzeln abgerundet, Basalrand fein erhaben und gekerbt, Streifen kräftig, eine breite von der Schulter in schwachem Bogen nach hinten auf die Naht zu gerichtete Binde, sowie das Spitzendrittel der Decken fein grau, im übrigen schwärzlich behaart. Beine schwarz, fein grau behaart, Schenkel mit einem feinen Dorn, Klauen in der Basalhälfte verschmoltzen.



FIGS. 4–7. Fühler von *Nanophyes*. 4. *Nanophyes proles* sp. nov. 5. *Nanophyes neuter* sp. nov. 6. *Nanophyes discoidalis* sp. nov. 7. *Nanophyes* (*Corimalia*) *varicolor* sp. nov.

6. **Nanophyes neuter** sp. nov. Fig. 5, antenna.

Praecedenti (N. proles) subsimilis, sed major, rostro longiore, niger, antennarum scapo, funiculi, sex-articulato, articulis duo-

[4] Mir liegt ein Exemplar, das von J. Faust als *N. rufipes* Motsch. bestimmt ist und aus Ceylon von Dr. Dohrn stammt, vor; es steht in keinem Widerspruch zur folgenden Diagnose Motschulskys:

Statura *N. lythri*, sed niger. Oblongus, convexus, nitidus, elytris antice utrinque fascia nebulosa, pedibus rufis, geniculis paulo infuscatis. Long., 3/41.; lat., 1/41.

bus basalibus trochanteribusque fulvis; elytris griseo, plaga magna dorsali, fere glabra subtilissime nigro-, pedibus parce griseo-pilosis; femoribus trispinosis.

Long., 2.5; lat., 1.7 mm.

LUZON, Laguna, mons Maquiling (*C. F. Baker*).

Grösser als *N. proles*, schwarz, fein grau behaart, Decken in der Mitte mit einer grossen gemeinsamen, bis zum 6. Streifen nach aussen reichenden, nur äusserst fein schwarz behaarten Makel. Fühlerschaft, sowie das 1. und 2. Geisselglied und die Trochanteren, bräunlichgelb. Rüssel fast doppelt so lang wie der Halsschild, beiderseits mit 2, nahe bis zur Spitze reichenden Punktstreifen und glatter, ziemlich breiter Mittelleiste, die Wurzel spärlich weiss behaart. Fühlergeissel 6-gliederig, die Keule deutlich (nicht lose) 4-gliederig, gestreckt, so lang wie die ersten 3 Geisselglieder zusammen. Halsschild konisch, an der Basis fast doppelt so breit wie in der Mittellinie lang, sehr fein und weitläufig punktiert, jeder Punkt mit feinem nach vorn gerichtetem Härchen. Flügeldecken viel feiner als bei *N. proles* gestreift, die Streifen an den Seiten verschwindend, überall fein greis behaart, die Haare normal orientiert. Schenkel mit einem grösserem Dorn und 2 kleineren Dornen.

7. Nanophyes discoidalis sp. nov. Fig. 6, antenna.

Niger, subtiliter griseo-pilosus, elytris plaga magna, subcordata communi, stria quinta determinata, rufa; antennis scapo fulvo, funiculo quinque-, clava laxe tri-articulatis, articulo secundo rotundato; femoribus trispinosis, spinis duabus distalibus minutissimis; tarsis unguiculis brevibus basi connatis.

Long., 2.2; lat., 1.4 mm.

LUZON, Laguna, Los Baños (*C. F. Baker*).

Schwarz, fein weisslich behaart, der Fühlerschaft gelbbraun, eine grosse den Decken gemeinsame und diese mit Ausnahme der Wurzel und des Seitenrandes fast ganz einnehmende Makel rot. Rüssel spärlich weiss behaart, ziemlich dick, und beim Männchen so lang wie der Halsschild. Fühler mit 5-gliederiger Geissel, die Keule lose drei-gliederig, länger als die 5 vorhergehenden Geisselglieder, ihr 2. Glied kugelig, sehr wenig länger als dick. Halsschild konisch, an der Basis breiter als lang (5:3), etwas entfernt und fein punktiert, jeder Punkt mit feinem, nach vorn gerichtetem Haar. Flügeldecken fein gestreift, das 1. Spatium breiter als die Naht, die schwarze Deckenbasis und der schwarze Seitenrand deutlicher spärlich behaart als die rote Scheibenmakel, die den grössten Teil der Decken einnimmt und am Vorderrande ausgebuchtet ist. Schenkel und Körperunterseite ziemlich lang, anliegend weiss behaart, erstere

mit einem grösseren proximalen Dorn und 2 kleinen distalen Dornen. Tarsen mit 2 kurzen, an der Wurzel verwachsenen Klauen.

8. **Nanophyes (Corimalia) varicolor** sp. nov. Fig. 7, antenna.

Niger, antennis, clava nigra excepta, elytris macula communi postmediana, antice latiore et ad humeros producta pedibusque, femorum apice exceptis, fulvis, sutura in primo quarto albopilosa; antennis funiculo sexies articulato; femoribus trispinosis, spina proximali majore, unguiculis binis, liberis.

Long., 2.4; lat., 1.3 mm.

LUZON, Laguna, mons Maquiling (*C. F. Baker*).

Schwarz, Fühler mit Ausnahme der schwärzlichen Keule, Prothorax, eine sehr grosse gemeinsame Makel auf den Decken und die Beine mit Ausnahme der angedunkelten Schenkelspitzen und schwarzen Tarsen gelbbraun, fein gelblich, das 1. Viertel der Naht dichter weisslich behaart. Rüssel beim Männchen wenig, beim Weibchen $1\frac{1}{2}$ mal so lang wie der Halsschild, bei ersterem der Rücken mit einer scharfen Mittel- und jederseits mit einer Seitenleiste, die streifenartigen Zwischenräume mit gereihten weisslichen Börstchen, bei letzterem glatt, nur an der Wurzel mit kurzen Punktreihen. Augen grob fazetiert, nur durch eine haarfeine, weiss behaarte Linie getrennt. Fühler mit 6-gliederiger Geissel, deren 2. Glied länger als das 1. ist, die folgenden an Länge etwas abnehmend, das letzte wenig länger als dick, die Keule so lang wie die 5 vorhergehenden Geisselglieder zusammen, schwärzlich, deutlich abgesetzt, 4-gliederig. Flügeldecken einfach gestreift, fein behaart, das 1. Spatium breiter als die Naht, hintere Deckenhälfte mit grosser gemeinsamer bräunlichgelber, ungefähr trapezoidaler Makel, die vorn breiter und nach den Schultern zu ausgezogen ist. Schenkel mit einem grösseren Dorn und 2 kleinen Dornen. Füsse mit 2 langen, freien Klauen.

9. **Apoderus (Cyanotrachelus) ledyardi** sp. nov.

Atro-cyaneus, epimeris mesosternalibus basi, metasternalibus totis albo-sericantibus; prothorace disco transverse strigoso; elytris usque ad apicem distincte striato-punctatis, spatio primo secundoque basi subcallosis, quarto basi vix plicato, reliquis subtiliter rugulosis ac punctulatis; abdomine sat fortiter punctato.

Long. thoracis plus elytris maris, 5; feminae, 4; lat., 2–2.4 mm.

LUZON, Laguna, Los Baños (*C. F. Baker*).

Schwärzlichstahlblau, nur die Epimeren der Mittelbrust an der Wurzel und die Episternen der Hinterbrust in der eingedrückten hinteren Hälfte weisslich, seidenglänzend, behaart.

Beim Männchen der Kopf mit dem Rüssel so lang wie der Halsschild und die Flügeldecken, sein halsartiger Basalteil undeutlich querfaltig, Halsschild konisch, etwas länger als an der Basis breit. Beim Weibchen der Basalteil des Kopfes 1½ mal so lang wie dick, sowie der hinter Teil des Kopfes leicht querrunzelig, Halsschild an der Basis etwas breiter als lang. Fünftes Glied der Geissel beim Männchen kürzer als das 1., so lang wie das 3., beim Weibchen so lang wie das 1. und länger als das 3. Halsschild mit undeutlicher Mittelfurche, in der hinteren Hälfte vor dem auch hinten durch eine Querfurche begrenzten Basalwulst fein querstreifig, die Streifen leicht mit ihrer Convexität nach hinten gebogen. Flügeldecken länger als breit (3:3.7), die Naht leistenartig erhaben, das 1. und 2. Spatium an der Basis mit gemeinsamer flacher Beule, dahinter kaum merklich eingedrückt, das 4. an der Wurzel sehr schwach fältchenartig, im übrigen die Zwischenräume leicht querrunzelig und sehr fein zerstreut punktiert. Pygidium, Mittelbrustepimeren und die Seiten der Hinterbrust sehr grob, die Seiten des Abdomens weniger grob punktiert. Schenkel, die gekörnelte Spitze ausgenommen, glatt, unbewehrt.

Von den ähnlich gefärbten Arten, wie *A. coloratus* Faust, *A. coeruleatus* Faust und 2 unbeschriebenen, die eine aus China (*A. sharpi* Faust i. l.) und einer anderen aus Formosa, steht die neue Art wegen der hinten nicht erlöschenden Deckenstreifen dem *A. coeruleatus* Faust, aus Birma, am nächsten, unterscheidet sich jedoch von ihm u. a. durch das auf der Scheibe quergestreifte Halsschild und die leicht querrunzeligen und fein punktierten Deckenspatien.

10. **Cionus (Stereonychus) reitteri** sp. nov.

Maximus, omnino dilute murino, aut cano-tomentosus; elytris spatiis alternatis punctis subtuberculato-seriatis scutelloque paulo pallidioribus; antennarum scapo funiculoque fulvis, clava nigra, elongata, funiculo fere aequilonga; prosterno margine antico emarginato; femoribus dente magno, obtuso, armatis.

Long., 5.5; lat., 3.8–4 mm.

MINDORO, Mangarin (*C. M. Weber;* Bur. Sci. Acc. No. 13434).

Die grösste mir bekannte *Cionus*-Art, die wegen der nur mit einer Klaue versehenen Tarsen zur Gattung *Stereonychus* zu stellen ist. Schwarz, ziemlich gleichmässig maus- oder aschgrau beschuppt. Rüssel fast doppelt so lang wie der Halsschild, ziemlich grob, teilweise gereiht punktiert, mit glattem Mittelstreifen. Zweites Glied der 6-gliederigen Geissel das längste, so lang wie die 4-folgenden zusammen, das letzte quer, der Keule angeschlossen, diese lang gestreckt, spindelförmig, fast so lang wie die ganze

Geissel. Augen durch einen sehr schmalen Streifen, der kaum so breit wie die Fühlergeissel dick ist, getrennt. Halsschild quer, gleichmässig gewölbt, im vorderen Drittel leicht eingeschnürt. Vorderbrust am Vorderrand schwach ausgerandet. Schildchen länglich weiss tomentiert. Flügeldecken mit kaum stärker erhabenen abwechselnden Zwischenräumen, diese mit wenig schwielig vortretenden, heller tomentierten Punktmakeln, die bei dem zweiten mir vorliegendem Exemplar ganz erloschen sind. Unterseite sowie die Oberseite beschuppt, alle Schenkel mit grossem, die vorderen mit stumpferem Zahne.

11. **Endymia apicalis** sp. nov. Fig. 8, antenna, ♂.

Nigra, fuscescenti-grisea squamosa, prothorace elytrisque tuberculis fusco-, macula apicali albicanti-squamosis; mas rostro in dimidia parte apicali carinula dorsomediana tenui, feminae leviusculo, antennarum scapo apice abrupte incrassato, funiculi longitudine clava aequali (mas), aut paulo longiore (femina); prothorace transverso, lateribus parallelis, antice constrictis, seria antemediana transversa e turberculis quatuor, disco utrinque impreso; elytris spatio secundo quartoque paulo elevatis tuberculis nigro-velutinis remote seriatis, circiter quinque; femoribus breviusculis nebulose fusco-annulatis.

Fig. 8. Fühler von *Endymia apicalis* sp. nov.

Long., 7.5; lat., 3 mm.

Luzon, Laguna, Los Baños (*C. F. Baker;* et Lamao, Bataan; Bur. Sci. Acc. No. 9801).

Schwarz, dicht mit bräunlichgrauen Schüppchen scheckig bedeckt, Decken mit dunkleren sammetartig braun beschuppten Höckerchen, sehr vereinzelten weissen Schuppenbörstchen und hellem Apicalfleck. Rüssel des Männchens fein runzelig punktiert und beschuppt mit feiner, an der Wurzel abgekürzter Dorsalleiste, der des Weibchens kürzer, vor den Fühlern glatt, in der Basalhälfte mit undeutlicher Mittelleiste. Fühlerschaft an der Spitze plötzlich verdickt, beim Männchen die Verdickung innen mit einer nach hinten gerichteten Spitze (siehe die Figur), Keule so lang, beim Weibchen etwas länger, als die Geissel. Thorax quer, mit parallelen Seiten und abgeschnürtem vorderem Drittel, hinter der Abschnürung mit einer Querreihe von 4 Höckern, die durch Eindrücke getrennt sind, von welchen der mittlere Eindruck eine glatte Mittelleiste aufweist, hinter den inneren 2 Höckern ein runder, flacher Eindruck. Schildchen rundlich, heller als die Umgebung beschuppt. Flügeldecken mit leicht erhabenem zweiten und vierten Spatium, die beide braun beschuppte, entfernt gereihte und erhöhte Punktmakeln aufweisen.

Vorletztes Spatium in der hinteren Hälfte mit einer, den Seitenrand bildenden Reihe feiner Körnchen, die je ein weisses Borstenschüppchen tragen, ausserdem über dem ersten Bauchsternit und über der Mitte der Hinterbrust mit weisser Punktmakel. Spitze des 3.–8. Spatiums mit gemeinsamer weisslicher Makel. Vorderschenkel des Männchens wenig länger als die des Weibchens.

Endymia philippinica[5] Heller unterscheidet sich von dieser neuen Art u. a. durch bedeutendere Grösse, durch den mehr konischen Halsschild, der keine Eindrücke zeigt, durch das quere Schildchen, den Mangel eines hellen Apicalflecken auf den Decken, etc.

12. **Idotasia paucisquamosa** sp. nov. Fig. 9, 9*a*.

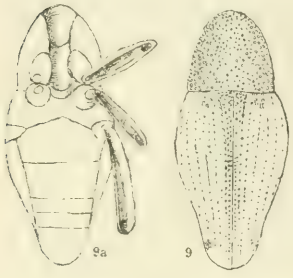


FIG. 9. *Idotasia paucisquamosa* sp. nov.

Nigra, elytris obscure rufis, punctis nonullis albo-squamosis uno utrinque majore, basali et apicali atomisque perpaucis subsuturalibus; sutura sat crebre, spatio primo secundoque remote seriato-punctatis.

Long., 3.5; lat., 1.5 mm.

LUZON, Laguna, Los Baños (*C. F. Baker*).

Nahe verwandt mit *I. honesta* Pasc., aber noch gestreckter. Rüssel in der Basalhälfte spärlich beschuppt, mit 3 feinen Längsleisten. Fühlergeissel 7-gliederig, rotgelb, die einzelnen Glieder vom zweiten ab, an Länge ab, an Dicke zunehmend, Keule eiförmig deutlich geringelt. Stirn mit sehr entfernten, groben Punkten. Halsschild so lang wie breit, an der Basis etwas breiter als an dem schwach abgeschnürten Vorderrande, die Seiten sehr leicht gerundet, ihre grösste Breite in der Mitte, Oberseite sehr grob und ziemlich dicht, längs der glatten Mittellinie etwas kleiner punktiert. Flügeldecken mehr als $1\frac{1}{2}$ mal so lang wie breit, vor der Mitte, im ersten Drittel, am breitesten, im Spitzendrittel leicht eingeschnürt, mit Reihen entfernter Punkte, von denen die 1. und 2. Reihe, namentlich nach der Spitze zu, streifenartig eingedrückt sind, die übrigen Punktreihen nur durch eine haarfeine Linie verbunden werden. Naht ziemlich dicht mit ungeordneten, 1. Spatium mit einer gröberen, 2. Spatium mit einer feineren Reihe von Punkten, Wurzel des 2. und 3. Spatiums mit gemein-

[5] *Phil. Journ. Sci., Sec. D* (1913), **8**, 143.

samer gelblichweisser Schuppenmakel, eine ähnliche kurz vor der Spitze zwischen dem 3. und 7. Streifen und einige wenige kleine Schuppenpünktchen auf dem 1. Spatium. Rücken der unterseits gefurchten Schenkel mit weisslichem Schuppensaum.

13. **Mecopus bakeri** sp. nov.

Ex affinitate M. hopei, niger, variegatim stramineo- et nigrotomentosus; prothorace vittis tribus obsoletis, ad basin in maculis tribus condensatis; scutello vittiforme, latitudine duplo longiore, griseo; elytris basi singulis rotundato-productis, sutura basi albicanti, in triente apicali ut spatio secundo post medium, asperato-granulosis; corpore subter stramineo-squamoso, metaepisternis in dimidia parte anteriore macula magna, rotundata nigra; femoribus posticis dimidia parte elytris superantibus.

Long., 7; lat., 3 mm.

LUZON, Laguna, Los Baños (*C. F. Baker*).

Eine grau und schwarz melierte Art, aus der Verwandtschaft des *M. hopei*, mit grossem dreieckigem Hinterschenkelzahn, Vorderbrust des Männchens jederseits mit kurzem Dörnchen. Rüssel des Männchens so lang wie die Flügeldecken, kräftig gereiht punktiert mit glatter Dorsallinie und feiner Seitenleiste. Fühler, mit Ausnahme des in der Basalhälfte rötlichen Schaftes, schwarz, 2. Geisselglied deutlich länger als das 1., die übrigen kegelförmig, unter einander ziemlich gleich lang. Halsschild $1\frac{1}{2}$ mal so breit wie lang, an der Basis jederseits ausgebuchtet, dicht punktiert, nur in der Mittellinie und beiderseits ein Längsstreifen spärlich, an der Wurzel dichter beschuppt. Schildchen doppelt so lang wie breit, weisslich beschuppt. Flügeldecken an der Wurzel einzeln gerundet, Punktstreifen kräftig, der 7. und 8. an der Schulter abgekürzt, die Naht in der hinteren Hälfte erhaben, mit einer nicht ganz bis zur Spitze reichenden Reihe entfernter Stachelkörnchen, 2. Spatium hinter der Mitte etwas gewölbt mit ungefähr 5 gereihten Stachelkörnchen. Körperunterseite dicht gelblichweiss, ein rundlicher Fleck in der vorderen Hälfte der Hinterbrustepisternen, der auf die Seiten der Hinterbrust übergreift, sowie die äusserste Spitze des Analsternites, schwarz beschuppt.

14. **Lobotrachelus gentilis** sp. nov.

Niger, antennis tarsisque fulvis, prothorace angulis posticis lobo scutellari maculaque utrinque postmediana, oculi magnitudine, elytris sutura, triente apicali excepta, interstitiis 1.–3. ad basin maculaque laterali postmediana, inter striam quartem et octavam, ut corpore subter albo-squamosis.

Long., 2.2–2.5; lat., 1–1.2 mm.

LUZON, Laguna, Los Baños (*C. F. Baker*).

Schwarz, Spitzensaum der Decken gelbrot durchscheinend. Vorderrand bis zu den Vorderecken sowie die Hinterecken des Halsschildes, der Scutellarlappen und jederseits vor ihm ein schräg gestellter, ovaler Tropfen, die Deckenwurzel und die basalen zwei Drittel der Naht (diese zuweilen in der Mitte unterbrochen), ferner jederseits im zweiten Drittel zwischen dem 4. und 8. Streifen ein ovaler Tropfen, der so gross ist wie der auf dem Halsschild, und eine kleine Quermakel an der Deckenspitze dichtweiss beschuppt. Rüssel so lang wie der Halsschild ohne dem Scutellarlappen, mit zwischen die Augen heraufreichendem, äusserst feinem Dorsalkielchen, in der Basalhälfte spärlich weiss, ziemlich lang und anliegend beborstet. Fühler rotgelb, das 5. Glied der 7-gliederigen Geissel etwas kleiner als das vorhergehende und folgende, so lang wie breit, Keule deutlich 4-gliederig, ihr 1. Glied an der Spitze etwas breiter als lang, ihr 2. Glied stark quer. Halsschild in der Mittellinie $1\frac{3}{4}$ mal so lang wie an der Wurzel breit, grob und ziemlich dicht, aber nicht tief punktiert, jeder Punkt mit schwarzem Börstchen, die Mittellinie in der Basalhälfte glatt. Vorderrand der Vorderbrust breit weiss, doch so beschuppt, dass die Vorderecken von oben her nur einige wenige weisse Schüppchen erkennen lassen. Halsschildhinterecken, der Scutellarlappen und jederseits davon, nahe dem Halsschildhinterrande, eine schräg gestellte Makel, von Form und Grösse des Auges, dicht weiss beschuppt. Flügeldecken sehr wenig länger als an der Schulter breit, an der rötlich gesäumten Spitze einzeln abgerundet, die 6 ganzen Dorsalstreifen tief, auf dem Grunde undeutlich entfernt punktiert. Tarsen gelbbraun, ihr 1. Glied so lang wie die drei Folgenden zusammen. Schenkel nahe der Mitte mit kleinem Zahne.

15. **Otidognathus elegans sericoplagia** subsp. nov.

Differt a specie typica: statura minore, colore tota nigra, prosterni, metasterni, sternitorum abdominaliumque lateribus, metaepisternis (margine antico glabro excepto) dense ochraceo-sericeo-pilosis.

Long., 13–15; lat., 6–7 mm.

LUZON, Cagayan, Ilagan (*H. E. Stevens;* Bur. Sci. Acc. No. 9773).

Otidognathus (*Litorrhynchus* olim.) *elegans* Fairm. ist eine in Grösse und Färbung, sowie bezüglich der Dichte der Behaarung der Körperseiten, sehr veränderliche Art. Mir liegen Stücke von 11.5 – 23 mm. Länge, ohne Rüssel, vor, die bald rot sind und

eine schwarze Makelzeichnung aufweisen, bald ganz schwarz sind. Gewöhnlich ist die Art dunkelrot, mit schwärzlichen Schenkelspitzen und ebenso gefärbtem Rüssel, ihr Halsschild zeigt einen breiten, nach hinten zu verbreiterten Mittelstreifen und am Seitenrande eine grosse ovale Makel, die weder den Vorder- noch den Hinterrand erreicht, ihre Decken haben hinter den Schultern eine Quere und zwischen dem 2. und 5. Streifen, in der Mitte der Decken, eine rundliche Makel, häufig ist auch der Spitzenrand der Decken schwarz. Neben diesen Stücken gibt es solche, die zwar den Halsschild eben so gemakelt haben, aber einfärbig braunrote Flügeldecken oder solche mit schwarzem Apicalrand aufweisen, oder solche bei denen der Halsschildmittelstreifen nur auf die vordere Hälfte beschränkt, oder gar nur zu einer kleinen Discalmakel reduziert ist, während die Decken bald Makeln, bald keine aufweisen. Bezüglich der Tomentierung ist zu erwähnen, dass die kleineren Stücke ein dichteres Haarkleid an den Körperseiten zeigen als die grösseren, doch lässt sich auch bei diesen wenigstens eine Spur einst vorhandener Tomentierung nachweisen. Am weitesten von der typischen Form entfernt sich die von mir als subspecies abgetrennte *sericoplagia*, die bei geringerer Körpergrösse und vorwiegend schwarzer Färbung dicht goldgelb behaarte Körperseiten aufweist, doch sind die Epimeren der Mittel- und Hinterbrust ganz, die Epimeren der Mittelbrust am Vorderrande breit kahl. Da sculpturelle Unterschiede nicht vorhanden zu sein scheinen, so kann die Form kaum artlich abgetrennt werden.

16. **Protocerius rufifrons** sp. nov. Fig. 10.

Supra, rostro, scutello pygydioque nigris exceptis, dilute ferrugineus, prothorace disco utrinque plaga oblongo-triangulari vittaque laterali, antice attenuata elytrisque lateribus nigris; rostro prothorace, margine antico constricto haud computato, fere aequilongo, dorso tuberculis geminatis circiter octo; prothorace carinula basali in medio dilatata; elytris quinque striatis, stria quarta quintaque basi paulo approximatis, vitta laterali, basi angustata, post humeros usque ad striam quintam dilatata, ante apicem abrupte angustata, margine apicali, nigro, conjuncta suturaque partim nigris; corpore subter nigro, maculis duabus fere connexis, infra marginem prothoracalem, episternis epimerisque mesosterni maxima parte, meta-episternis in dimidia parte supero-posteriore metasternoque in angulis posticis fulvescenti-ferrugineis; tibiis anticis fortiter compressis, prothorace aequilongis, longitudinaliter subsulcatis.

Long. (sine rostro), 47; rostri, 16; prothoracis, 19; lat. thor., 15.7 mm.

MINDANAO, ad flumen Agusan (*C. M. Weber;* Bur. Sci. Acc. No. 17309).

Von der Grösse und Gestalt des *P. grandis* Guér. und von allen Arten durch die mit dem Halsschild gleich gefärbte rostgelbe Stirn und durch die auffallende schwarze Makelzeichnung ausgezeichnet. Von der rostgelben Oberseitenfärbung sind ausgenommen: Der Rüssel, das Pygidium, der abgesetzte Vorderrand des Halsschildes, je eine lange, keilförmige, vorn spitze Makel, beiderseits auf der Scheibe des Halsschildes, die aber nur bis zur Höhe der Hinterecken nach hinten reicht, ein von oben eben noch sichtbarer Seitenrandstreifen, die Seiten der Decken, hinter der Schulter bis zum 5. Streifen nach innen zu, vor der Spitze des 4. Streifens aber plötzlich schmal und mit dem Spitzenrand zusammenhängend und stellenweise auch die Naht, schwarz. Unterseite grösstenteils schwarz, rötlichgelb sind:

FIG. 10. *Protocerius rufifrons* sp. nov.

Zwei fast zusammenhängende Längsmakeln beiderseits unterhalb des Seitenrandes des Halsschildes, von welchen die vordere bandförmig, die hintere dreieckig ist, die Episternen der Mittelbrust, mit Ausnahme des schmalen, oberen Randes, deren Epimeren mit Ausnahme der unteren spitzen Hälfte, die hintere, obere, durch die Diagonale begrenzte Hälfte der Hinterbrustepisternen, je eine grössere Makel in den Hinterecken der Hinterbrust und eine kleinere runde an deren Seiten, in der Mitte. Beine relativ schlank, die Hinterschenkel das 4. Abdominalsternit deutlich überragend. Vorderschienen sehr lang, stark compresst, an der Wurzel mit Zahn, an der Innenfläche mit flacher Längsfurche.

ANTHRIBIDÆ

17. **Mecocerina guttata jordani** subsp. nov.

Differt a specie typica: prothorace disco haud vittato sed utrinque ante et post carinam macula nigra punctiformi, posterioribus quam anterioribus plus approximatis; antennis fulvis, articulis tribus apicalibus nigris; tibiis tarsisque totis fulvis.

Long., 9; lat., 3.5 mm.

LUZON, Laguna, Los Baños (*C. F. Baker*).

Dunkel rotbraun, dicht lehmgelb tomentiert, Fühler gelbbraun, die letzten 3 Glieder schwarz, Halsschild vor der Mitte unter und dicht über dem Seitenrande, sowie beiderseits der Scheibe

vor und hinter der Antebasalleiste, mit je einem schwarzen Punkt, von welchen letztere einander mehr genähert sind als die vor der Leiste gelegenen. Flügeldecken mit einer Discoidalreihe von 2 grossen und einem kleinen apicalen, sowie mit einer Marginalreihe von 4 kleinen schwarzen Punktmakeln. Alle Schienen und Tarsen gelbbraun, goldgelb tomentiert.

Diese Unterart ist Herrn Dr. K. Jordan, Tring, der so gütig war sie zu vergleichen und sie mir als eine Form von *M. guttata* Jord.[6] zu bezeichnen, in aufrichtiger Dankbarkeit gewidmet.

CERAMBYCIDÆ

18. **Epania (?) longicollis** sp. nov. Fig. 11, 11*a*.

Nigra, omnino parce longeque albido-pilosa, antennis dimidiaque basali femorum, tibiis tarsisque rufis, elytris testaceis, dimidia parte apicali nigro-plagiatis; prothorace latitudine multo longiore, reticulato-punctato, maxima latitudine in secundo triente, lateribus rectis, postrorsum divergentibus; elytris coxis posticis haud superantibus, apice singulis rotundatis, sat fortiter, apice remotius punctatis, vitta humerali levi; abdomine nigro-nitido, sternitis abdominalibus tres anticis, ante medium, transverse sulcatis, in parte basali fortiter punctatis, quatuor anticis lateribus per totam longitudinem foveolato-impressis; femoribus clavatis, posticis sternito secundo abdominali paulo superantibus; unguiculis basi dente minuto.

FIG. 11. *Epania (?) longicollis* sp. nov.

Long., 8; lat., 1.5 mm.

LUZON, Laguna, Los Baños (*C. F. Baker*).

Schwarz, überall mit feinen abstehenden, weissen Wimpern spärlich besetzt, Fühler, Basalhälfte der gekeulten Schenkel, alle Schienen und Tarsen rot, Flügeldecken lehmgelb, mit ovalem, die Apicalhälfte einnehmenden, schwarzen Fleck. Kopf quer, netzartig punktiert, nicht schnautzenartig verlängert. Fühler die Spitze der Hinterschenkel kaum erreichend, ihr 3. Glied länger als das 4., dieses kürzer als das 5. Halsschild viel länger als breit, netzartig, der Vorderrand grob und einfach punktiert, der abgeschnürte Basalteil quer strigiliert, Seiten gerade, nach hinten divergierend, ihre grösste Breite im zweiten Drittel ihrer Länge, Mittellinie in der hinteren Hälfte furchenartig vertieft.

[6] *Novit. Zool.* (1903), 10, 427 (die Stammart ist aus Nord Celebes beschrieben).

Schildchen kurz dreieckig, über die Naht erhaben, schwarz. Flügeldecken wenig länger als zusammen breit, an der Spitze einzeln abgerundet, mit ringsum laufender Randfurche, grob und dicht, im Spitzenteil sparsamer punktiert, ein von den Schultern innen bis zur Deckenmitte hinziehender Streifen glatt. Seiten der Vorderbrust vor den Vorderhüften fast ganz (vergl. Fig. 11*a*.) von einer grossen, ovalen, innen dicht weisslich behaarten Grube eingenommen. Hinterbrust ziemlich dicht und grob punktiert. Hinterleib glänzend schwarz, die 3 vorderen Sternite näher der Wurzel mit einer Querfurche, der Basalteil vor dieser grob punktiert, alle Sternite, mit Ausnahme des letzten Sternites, an den Seiten mit tiefer ihre ganze Länge einnehmender Längsgrube. Schenkel glänzend, die hinteren das 2. Abdominalsternit etwas überragend. Klauen am Grunde mit kleinem Zähnchen.

Diese Art ist wahrscheinlich Repräsentant einer neuen Gattung, auf die ich bei späterer Gelegenheit noch zurückzukommen gedenke.

19. **Pharsalia truncatipennis** sp. nov.

Pharsalia agenori simillima, sed elytris apice truncatis, truncatura angulo externo haud producto, macula laterali postmediana nulla.

LUZON, Laguna, mons Maquiling (*C. F. Baker*).

Der *Ph. agenor* in Grösse, Färbung und Sculptur sehr ähnlich, jedoch die Flügeldecken an der Spitze einfach abgestutzt, ohne vorgezogene Aussenecke und an den Seiten, hinter der Mitte, ohne grössere schwarze Makeln. Ausser diesen Unterschieden bin ich nicht im Stande noch irgend einen weiteren wesentlichen Unterschied anzugeben, so dass ich die Form, wäre der plastische Unterschied an der Deckenspitze nicht vorhanden, nur als Varietät aufführen würde. Unterseite, wie bei *Ph. agenor*, dicht schmutzigrehbraun tomentiert, die Abdominalsternite jedoch nur an den Seiten, nicht auch in der Mitte, mit einer Kahlmakel am Hinterrande.

Genus **OBEREA** Muls.

Weitaus die grösste Zahl der indo-malayischen Arten der Gattung ist von Pascoe 1867 in den Trans. Ent. Soc. London, III, 3, 420–438, beschrieben worden, sie wurde später namentlich von Gahan, Fairmaire, Jordan und v. Heyden durch Arten aus Birma, Tonkin, Celebes und Borneo wesentlich vermehrt, so dass es bei der Unbestimmtheit der von den Autoren angegebenen Merkmale (Fühler- und Schenkellänge, Thoraxform, Höhe der Wangen im Vergleich zur Höhe des unteren Augenlappens, sollten immer angegeben werden) recht schwierig ist, einen Überblick

über die verwandtschaftlichen Beziehungen der Arten zu gewinnen. Die Beschäftigung mit dieser Gattung lehrt nur, dass die Arten local sehr beschränkt sind.

Daher gelang es mir trotz aller Mühe nicht die *Oberea*-Arten, die mir in stattlicher Anzahl von den Philippinen vorlagen, mit Ausnahme einer einzigen Art (*seminigra*) mit bereits bekannten Arten zu identifizieren.

Neben dem von Professor Baker gesammelten Material und dem aus dem Bureau of Science lagen mir, aus der Sammlung des Kgl. Zoologischen Museums in Dresden, auch noch von Dr. A. Schadenberg und dem bekannten Orchideensammler W. Micholitz herrührende Arten vor, so dass die 3 bisher von den Philippinen bekannten Formen um 2 vermehrt werden. Bemerkenswert ist dabei, dass mir 2 der Newman'schen Arten unbekannt geblieben sind: *demissa* und *macilenta* (nec *macilenta* Pasc., die ich für eine andere Art halte), doch habe ich sie in der folgenden Artübersicht einzureihen vermocht; alle scheinen der 2. Gruppe Pascoes: Deckenspitze schräg ausgerandet, der Aussenwinkel vorgezogen, anzugehören.

a^1. Erstes Fühlerglied schwarz.
  b^1. Abdomen ganz schwarz.
    c^1. Hinterschenkel schwarz.
      d^1. Flügeldecken ganz schwarz oder höchstens mit verwaschenem bräunlichem Längswisch an der Wurzel.
        e^1. Kopf schwarz, Thorax und Mund dunkelrot. **O. erythrostoma sp. nov.**
          f^1. Halsschild mit breitem schwarzen Basal- und Apicalrand und eben solchem Mittelstreifen..... **O. melanostoma sp. nov.**
          f^2. Halsschild ganz rot..... **O. macilenta New.**[1]
        e^2. Kopf und Halsschild gelbrot, grösste Breite des letzteren hinter der Mitte..... **O. schadenbergi sp. nov.**
      d^2. Flügeldecken an der Wurzel ganz gelbrot.... **O. quianga sp. nov.**
    c^2. Hinterschenkel gelb oder rotgelb, Flügeldecken der ganzen Länge nach mit schmutziggelben Längsstreifen..... **O. makilingi sp. nov.**
  b^2. Abdomen schwarz, 4. Sternit gelb, Flügeldecken mit gelben Spitzenfleck..... **O. flavoterminata sp. nov.**
  b^3. Abdomen an der Wurzel, das 1. Sternit ganz, das 2. meist grösstenteils gelb.
    g^1. Kopf schwarz, Thorax rot, Flügeldecken schmutziggelbbraun, alle Schenkel gelblich..... **O. albocuspis sp. nov.**
    g^2. Kopf, Halsschild und Schenkel bräunlich oder rotgelb.
      h^1. Hinterbrust, ausgenommen die vordere Hälfte, sowie die Seitenstücke schwarz..... **O. balineæ sp. nov.**
      h^2. Hinterbrust und Seitenstücke ganz gelb.
        i^1. Fühler schwarz, Abdomen nur an den Seiten deutlich punktiert. **O. seminigra Chvr.**
        i^2. Fühler vom halben 4. Glied ab rostrot, Abdomen überall kräftig punktiert..... **O. punctiventris sp. nov.**

b^4. Abdomen ganz gelb.

j^1. Halsschild mindestens so lang wie breit, Flügeldecken im Spitzendrittel kaum punktiert..... **O. micholitzi sp. nov.**

j^2. Halsschild quer, Flügeldecken im Spitzendrittel deutlich punktiert. **O. mimetica sp. nov.**

a^2. Erstes Fühlerglied bräunlichgelb, Thorax gelb, Abdomen schwarz, an der Wurzel goldig behaart, Füsse gelb, Hintertibien schwarz. **O. demissa New.**[7]

20. **Oberea erythrostoma** sp. nov.

Nigra, subtilissima griseo-pubescens, ore rufescenti-fulvo; prothorace rufo, antennarum articulo apicali albido; fronte rude remoteque, prothorace, subtransverso, subtilius punctatis, hic transverse subrugoso; elytris in triente basali fortiter, apicem versus sensim subtilius seriato-punctatis; abdomine lateribus vix punctatis, coxis posticis parte interna trochanteribusque fulvis.

Long., 16; lat., 2.5 mm.

LUZON, Laguna, Los Baños (*C. F. Baker*); et Atimonan (*W. Micholitz*).

Schwarz, fein grau pubescent, die Umgebung des Mundes, vom Stirnunterrand ab und die Backen, rotgelb, Halsschild rot, Fühler die Decken überragend, ihr Spitzenglied weisslich, das 4. Glied viel länger als das 3. (5:3.3), das 5. wenig kürzer als das 4. Kopf breiter als der leicht quere Halsschild, dieser mit zerstreuten und feineren Punkten als jener, mit undeutlichen Querrunzeln und in der hinteren Hälfte mit Mittelleiste. Schildchen leicht quer, schwarz, grau tomentiert. Flügeldecken im Basaldrittel mit groben, weiter hinten viel feiner werdenden Punktreihen. Abdomen mit sehr zerstreuten, besonders an den Seiten undeutlichen Punkten und daselbst dichter tomentiert. Hinterschenkel das 1. Bauchsternit sehr wenig überragend.

[7] Bei der schweren Zugänglichkeit lasse ich hier die Originalbeschreibungen folgen:

Oberea macilenta: Nigra, prothorace rufo, antennæ corpore vix breviores pilosae; oculi prominentes; caput prothorace manifeste latius; elytra aspere punctata, punctis magnis, profundis, lineatim dispositis; apice oblique truncata, angulis acute productis; pedes brevissimi: insectum gracillimum. 0.625 unc., lat. 0.065 unc.

Oberea demissa: Facies gibba, faciei epicranisque sulcus manifestus longitudinalis continuus; oculi prominentes, nigris; antennæ nigrae, articulo basali fulvo; caput fulvum; prothorax fulvus, linea dorsali, longitudinali, subelevata, concolori; scutellum fulvum; elytra nigra, basi sordide fulva, perlonga, dorso longitudinaliter depressa, aspere puncta, punctis vix ordinatis, apice subrotunda, intus oblique truncaturae externo paullo producto; abdomen nigrum, basi aureo-villosum; pedes breves, fulvi, metatibiis nigris, tarsis piceis. Corp. long. 0.725 unc., lat. 0.15 unc.

Hinterbrust mit zerstreuten, längeren weissen Haaren. Hinterhüften innen und die hinteren Trochanteren ganz gelbbraun. Vorderschienen gleich breit, schwach gebogen.

21. **Oberea melanostoma** sp. nov.

Nigra, prothorace margine antico et postico vittaque mediana nigris exceptis sanguineis; elytris in triente basali seriato-, in triente apicali (striis subsuturalibus exceptis) haud punctatis; corpore subter subtiliter griseo-tomentoso, abdomine lateribus distinctius punctatis; femoribus posticis sternito abdominali primo parum superantibus.

Long., 13.5; lat., 2 mm.

LUZON, Laguna, mons Maquiling (*C. F. Baker*).

Schwarz, fein grau tomentiert, Halsschild, mit Ausnahme des schwarzen, durch einen Mittelstreifen verbundenen Vorder- und Hinterrandes, rot. Epistom bräunlichgelb. Fühler ganz schwarz, das 4. Glied fast um ein Viertel länger als das 3. Halsschild deutlich länger als breit, sein Vorderrand sehr stumpfwinkelig ausgerandet, beiderseits des breiten schwarzen Mittelstreifen unregelmässig zerstreut punktiert, die Zwischenräume leicht quer runzelig. Flügeldecken im basalen Drittel mit 5, von oben sichtbaren Punktreihen, deren Punkte wesentlich kleiner als die Spatien sind und weiter nach hinten zu noch kleiner und unregelmässiger werden, im Spitzenviertel, abgesehen von einigen Punkten längs der Naht, jedoch ganz erlöschen. Die äussere Ecke der sehr schräg abgestutzten und leicht ausgerandeten Deckenspitze mit spitzem Dorn. Körperunterseite ausser der feinen grauen Pubescenz mit zerstreuten längeren weisslichen, die Oberseite mit ebensolchen schwarzen Haaren. Hinterschenkel das 1. Bauchsternit sehr wenig überragend. Bauchsternite an den Seiten entlang des Deckenseitenrandes mit unregelmässig zerstreuten, gröberen Punkten. Vorderschienen stärker als bei anderen Arten gebogen.

22. **Oberea schadenbergi** sp. nov.

Nigra, capite prothoraceque rufo-testaceis; antennis corpore longioribus, articulo ultimo toto, paenultimo parte majore albidis; Prothorace maxima latitudine post medium et hic capite aequilato; scutello luteo; elytris seriato-punctatis, punctis apicem versus magnitudine decrescentibus; abdomine, ut pedibus, nigris, lateribus haud distinctius punctatis, femoribus posticis sternito abdominali primo vix superantibus.

Long., 14; lat., 2 mm.

LUZON, Laguna (*A. Schadenberg*).

Der Färbung nach muss diese Art der mir unbekannten *O. rubetra* Pasc. ähnlich sein, unterscheidet sich aber von ihr durch die Fühlerspitze, deren letztes Glied ganz, deren vorletztes in der grösseren Apicalhälfte weisslich ist. Drittes bis 6. Fühlerglied an Länge zunehmend, das 6. sehr deutlich länger als das 3. Halsschild so lang wie breit, seine grösste Breite hinter der Mitte, feiner und zerstreuter als der Scheitel punktiert, mit undeutlichen Querrunzeln, in der Basalhälfte mit glattem Mittelstreifen. Schildchen bräunlich. Flügeldecken wie gewöhnlich im basalen Drittel mit grösseren, nach hinten zu allmälig kleiner werdenden gereihten Punkten, die aussen doch bis zur Deckenspitze kenntlich sind. Abdomen sowie die Mittel- und Hinterbrust und alle Beine schwarz, fein grau behaart. Seiten des Abdomens ohne grössere Punkte.

Die Art gleicht auch einer mir vorliegenden Art aus Bali, die ebenfalls eine weissliche Fühlerspitze hat, deren Halsschild aber vollkommen cylindrisch ist und deren Flügeldecken an der Wurzel einen hell bräunlichen Längswisch aufweisen.

23. **Oberea quianga** sp. nov.

Nigra, capite, prothorace, scutello elytrorumque octava parte basali rufo-testaceis, antennarum articulis duobus apicalibus albidis, prothorace latitudine paulo longiore, indistincte punctato, lateribus aequaliter subrotundatis; elytris ad basin punctis seriatis, paulo majoribus, retrorsum decrescentibus, sed etiam in parte apicali sat conspicuis; mesosterno episternisque rufis, metasterno abdomineque nigris, segmentis tres anterioribus ante medium impressione laterali punctiforme, transversa.

Long., 13; lat., 2 mm.

MINDANAO, Davao (*W. Micholitz*).

Schwarz, Kopf, Halsschild, Mittelbrust und das basale Achtel der Decken gelbrot, die 2 letzten Fühlerglieder weisslich. Stirn grob und zerstreut, Scheitel etwas dichter punktiert. Viertes Fühlerglied um zwei Drittel länger als das 3. Halsschild etwas länger als breit, am Vorder- und Hinterrande leicht abgeschnürt, beiderseits schwach querrunzelig. Punktreihen der Decken an der Basis kräftig, nach hinten zu zwar feiner werdend, aber auch im Spitzenteil kenntlich. Abdomen schwarz, fein grau tomentiert, seine 3 vorderen Sternite an den Seiten, vor der Mitte, mit querem Grübchen. Hinterschenkel die Hälfte des 2. Abdominalsternites kaum erreichend.

24. **Oberea makilingi** sp. nov.

Nigra, capite, prothorace femoribusque fulvis, elytris per totam longitudinem vitta discoidali ochracea; antennis elytris distincte

superantibus, nigris vertice prothorace multo grossius punctato; prothorace latitudine paulo longiore, fere cylindrico, brevissime aurato-tomentoso, remote punctato, disco utrinque plaga, in medio calositate oblonga, postice subsulcata, glabriusculis; elytris apice oblique truncatis ad suturam acute dentatis; abdomine nigro, subtilissime griseo-tomentoso, lateribus haud fortius punctatis; femoribus sternito primo abdominali superantibus.

Long., 13.5; lat., 2 mm.

LUZON, Laguna, mons Maquiling (*C. F. Baker*).

Schwarz, Kopf und Halsschild rotgelb, Schenkel gelb, Flügeldecken der ganzen Länge nach auf der Scheibe mit bräunlichgelben Längsstreifen. Backen etwas weniger hoch wie der untere Augenlappen. Stirn und Scheitel tief und gröber wie der Halsschild, erstere etwas sparsamer punktiert. Fühler ganz schwarz, ihr 3. Glied deutlich kürzer als das 4. Halsschild ziemlich cylindrisch, breiter als lang, viel feiner als der Scheitel punktiert, beiderseits der Scheibe und längs der Mittellinie unpunktiert, in der Basalhälfte mit feiner Mittelfurche, die Punktreihen schon im ersten Drittel feiner werdend, im Spitzenfünftel ganz erloschen. Der gelbe Discoidalstreifen reicht vom 1.–5. Punktstreifen und lässt nur einen schmalen Nahtstreifen und die schwarzen Deckenseiten frei. Alle Hüften, Hinterbrust und Abdomen, sowie die Schienen und Tarsen, schwarz, Hinterschenkel den Hinterrand des 1. Bauchsternites überragend.

25. **Oberea flavoterminata** sp. nov. Fig. 12.

Nigra, elytris postrorsum fortiter angustatis, disco in quarto basali fuscescenti, singulis gutta apicali flava; femoribus anticis totis, reliquis basi rufis; segmento abdominali quarto fulvo.

Long., 16; lat. hum., 2 mm.

LUZON, Laguna, Los Baños (*C. F. Baker*).

Schwarz, Taster, 4. Bauchsternit und ein länglicher Tropfen auf der Deckenspitze gelb, die ganzen Vorderschenkel und die Wurzel der beiden hinteren Paare rot, Decken im 1. Viertel mit einem hinten spitz zulaufenden, bräunlichen Längswisch. Kopf breiter als der Halsschild, sehr fein gelblich tomentiert, am Unterrande der fast die Mandibelwurzel tangierenden Augen mit einem längeren Wimpernkranz. Halsschild deutlich länger als breit, cylindrisch, die Seiten hinter der Mitte kaum merklich erweitert, in der hinteren Hälfte mit feiner Mittelleiste, längs des Vorderrandes leicht querstreifig gerunzelt, im übrigen zerstreut punktiert. Schildchen zungenförmig, etwas breiter als lang. Flügeldecken an der Wurzel kaum breiter als der Halsschild, nach hinten bis zur Abdomenwurzel hin stark verengt, dann bis zur

FIG. 12. *Oberea flavoterminata* sp. nov.

Spitze hin gleich schmal, mit an der Wurzel groben und unordentlichen, hinten feiner werdenden Punktreihen, von denen die an der Naht bis zur Spitze reichen, jede Deckenspitze mit doppelt so langer wie breiter, dunkel gelber, ovaler Makel. Hinterschenkel die Hälfte des 2. Bauchsternites nicht erreichend. Seiten des Abdomens bis zur Hälfte des 3. Sternites zerstreut aber deutlich, von da ab verschwindend punktiert. Letztes Sternit etwas glänzend, tief schwarz. Vorderschienen an der Spitze keulenartig erweitert.

26. **Oberea albocuspis** sp. nov.

Fusca, capite nigro, regione orali genisque ut thorace rufis; antennis corpore longioribus, nigris, articulo tertio quarto breviore, articulo apicali nigro; prothorace fere quadrato, longitudine paulo latiore, ad basin distinctius quam ad apicem constricto, remote punctato, in dimidia parte basali carinula mediana obsoleta; elytris luteis, lateribus infuscatis, punctis seriatis apicem versus subtilissimis; metasterno, meta-episternis abdomineque in dimidia parte apicali nigricantibus, femoribus fulvis, posticis dimidium sterniti abdominali secundi fere attingentibus, tibiis tarsisque infuscatis.

Long., 16; lat., 2.5 mm.

LUZON, Laguna, Los Baños (*C. F. Baker*).

Eine mit *O. erythrostoma* verwandte Art, mit schwarzem Kopf, rötlichem Mund und Halsschild und eben solchen Wangen, gelbbraunen, an den Seiten dunkleren Flügeldecken, mit Ausnahme des weissen Endgliedes schwarzen Fühlern, gelben Schenkeln, bräunlichen Schienen und Tarsen und in der hinteren Hälfte schwarzem Hinterleib. Unterer Augenlappen deutlich höher als die Wangen. Halsschild wenig breiter als lang, fast quadratisch, vor der Basis stärker als am Vorderrand eingeschnürt, zerstreut punktiert, in der Basalhälfte mit feiner Mittelleiste, an den Seiten mit einzelnen langen Wimpern. Flügeldecken im ersten Drittel mit gröberen, nach hinten zu feiner werdenden, bis zur Spitze reichenden Punktreihen. Hinterbrust und ihre Seitenstücke schwärzlich, 1. und 2. Bauchsternit bräunlichgelb, allmälig in die schwarze Färbung des Abdomens übergehend, alle Hüften und Schenkel gelb, die hinteren die Hälfte des 2. Abdominalsternites erreichend. Schienen und Tarsen bräunlich, Abdomen fein greis behaart, ohne gröbere Punktierung an den Seiten.

27. **Oberea balineæ** sp. nov.

♂ et ♀ : Fulvo-testacea, antennis, corpore brevioribus, elytris quinta parte basali excepta, metasterno in dimidia parte postica, metepisternis, sericantibus, totis, abdomine sternitis quatuor posticis, tibiis posticis tarsisque omnibus nigris; abdomine lateribus haud distinctius punctato.

Long., 17–19; lat., 3–3.2 mm.

LUZON, Laguna, Los Baños (*C. F. Baker*).

Bräunlichgelb, die Fühler, die grössere Hälfte der Hinterbrust, deren Seitenstücke ganz, die Decken in den hinteren vier Fünfteln, die hinteren 4 Abdominalsternite, die Hintertibien ganz, die 2 vorderen Paare in der Apicalhälfte des Aussenrandes und alle Tarsen schwarz, Backen so hoch wie der verticale Durchmesser des unteren Augenlappens. Fühler die Hinterleibsspitze nicht überragend, ihr 4. Glied viel kürzer als das 3., das 5. so lang wie das 1. Halsschild deutlich breiter als lang, aufstehend gelb behaart, am Vorder- und Hinterrande leicht abgeschnürt, die Seiten schwach gerundet, Oberseite zerstreut punktiert, in der hinteren Hälfte beiderseits leicht eingedrückt, mit sehr groben Punkten, davor eine glatte Schwiele. Schildchen, sowie die Basis der Decken, bräunlichgelb, doch verläuft die Abgrenzungslinie bei diesen nicht quer, sondern es reicht die schwarze Färbung bis zur Hälfte der Hinterbrustepisternen nach vorn, während sich die gelbe Basalfärbung der Decken als verwaschener Streifen bis zur Höhe der Hinterhüften nach hinten erstreckt. Drittes Spatium in der Basalhälfte leicht gewölbt, die hinten kleiner werdenden Punkte der Reihen auch im Spitzenteil deutlich. Hinterschenkel die Mitte des 2. Abdominalsternites erreichend.

28. **Oberea punctiventris** sp. nov.

♂ et ♀ : Ferruginea, antennarum articulis tres basalibus basique quartae nigris; elytris tribus quartis apicalibus abdomineque apicem versus infuscatis, hoc ubique distincte remoteque punctato; femoribus posticis sternito abdominali primo paulo superantibus.

Long., 11–12; lat., 1.5–2 mm.

LUZON (*A. Schadenberg*).

Gelblichrostbraun, die 3 basalen Fühlerglieder und die Wurzel des 4. Fühlergliedes schwarz, die hinteren drei Viertel der Decken gebräunt. Stirn stark gewölbt, unterer Augenlappen relativ gross, so dass die Entfernung seines Unterrandes von der Mandibelwurzel kaum die Dicke des 3. Fühlergliedes übertrifft. Fühler die Deckenspitze nur wenig überragend, in der grösseren Spitzenhälfte rostgelb. Halsschild vollkommen cylindrisch, deut-

lich länger als breit, ohne Basalrandfurche, undeutlich zerstreut punktiert, fein tomentiert und, sowie die Deckenwurzel, mit spärlichen feinen abstehenden Haaren. Flügeldecken fast bis zur Spitze hin deutlich gereiht punktiert, ihre Spitze schräg abgestutzt, mit kaum vorgezogenen Ecken. Abdomen überall fein, aber deutlich zerstreut punktiert, nach hinten zu allmälig dunkler, die letzten 2–3 Sternite meist ganz schwarz. Beine ganz gelbbraun, Hinterschenkel den Hinterrand des 1. Sternites deutlich überragend.

29. **Oberea micholitzi** sp. nov.

Fulva, antennis elytrorum apicem haud attingentibus elytrisque dimidia parte apicali nigris; genis lobo oculari inferiore altitudine aequali; prothorace latitudine longiore, fere cylindrico, disco rude punctato, punctis nigro-ciliatis, basi utrinque callositate oblonga; elytris basi capite angustioribus, punctis serratis nigro-ciliatis, post medium evanescentibus; pedibus totis fulvis, femoribus posticis sterniti primi abdominalis apicem haud attingentibus.

Long., 18; lat., 2.5 mm.

MINDANAO, Davao (*W. Micholitz*).

Rötlichgelb, die die Decken nicht überragenden Fühler und die hintere Hälfte der Decken schwarz. Unterer Augenlappen relativ klein, so dass seine Höhe der der Backen gleichkommt. Halsschild deutlich länger als breit, hinter dem Vorder- und dem Hinterrande kaum merklich eingeschnürt, namentlich auf der Scheibe mit groben zerstreuten Punkten, deren jeder eine schwarze Wimper trägt und deren Zwischenräume leicht querfaltig sind, Seiten mit einem geglätteten Wulst, der nahe den Hinterecken beginnt und sich bis zur Vorderrandabschnürung erstreckt. Flügeldecken schon von der Mitte ab sehr fein gereiht-punktiert, die grössere hintere Hälfte schwarz, vorn verwaschen. Unterseite und die ganzen Beine rotgelb, Abdomen an den Seiten ohne deutlichere Punktierung. Hinterschenkel den Hinterrand des 1. Bauchsternites nicht erreichend.

30. **Oberea mimetica** sp. nov.

Fulva, antennis corpore brevioribus, in triente apicali ferrugineis, elytris in dimidia parte apicali nigris; prothorace transverso, fulvo-velutino, ante basin sulco transverso obsoleto; elytris apice oblique subsinuatis; corpore subter pedibusque concoloribus fulvis, femoribus posticis sternito primo abdominali distincte superantibus.

Long., 17–18; lat., 3–3.2 mm.

LUZON (*A. Schadenberg*).

Bräunlichgelb, Fühler schwarz, ihr Spitzendrittel rostgelb, Apicalhälfte der Decken schwarz. Höhe der Backen nur wenig kleiner als die des unteren Augenlappens. Halsschild quer, dicht sammetartig bräunlichgelb tomentiret, undeutlich zerstreut punktiert und in den Hinterecken mit rundlicher Kahlschwiele, die meist mit einer ähnlichen beiderseits der Scheibe zusammenfliesst. Punktreihen der Decken nach hinten zu verhältnismässig nur wenig kleiner werdend und auch im Spitzendrittel deutlich. Körperunterseite und Beine ganz gelb. Hinterschenkel die Mitte des 2. Bauchsternites erreichend. Seiten des Abdomens ohne gröbere Punkte.

ANHANG

Von anderen bemerkenswerten Funden in und in der Umgebung von Los Baños, die Prof. C. F. Baker machte, möchten wir anhangsweise noch erwähnen.

Galba auricolor Bonv.
Galba funebris Chevr.
Cylas turcipennis Boh.
Omphasus mansuetus Faust.
Gasterocercus anatinus Chevr.
Telephaë obliquefasciata Mots.
Pempheres affinis Faust.
Phænomerus sundevalli Boh.
Oxypygus exclamationis Wied.
Diocalandra discors Faust.
Cerobates sexsulcatus Mots.
Gelonætha hirta Thoms.
Xylotrechus australis G. P.
Xylorrhiza adusta Wied.
Nyctimene vittata Pasc.
Ostedes pauperata Pasc.

ERKLÄRUNG DER FIGUREN

FIG. 1. *Trypeticus longicollis* sp. nov.
2. *Epiechinus lagunæ* sp. nov.
3. *Semnodema bakeri* sp. nov.
4. Fühler von *Nanophyes* (s. str.) *proles* sp. nov.
5. Fühler von *Nanophyes neuter* sp. nov.
6. Fühler von *Nanophyes discoidalis* sp. nov.
7. Fühler von *Nanophyes* (*Corimalia*) *varicolor* sp. nov.
8. Fühler von *Endymia apicalis* sp. nov.
9. *Idotasia paucisquamosa* sp. nov.
10. *Protocerius rufifrons* sp. nov.
11. *Epania* (*?*) *longicollis* sp. nov.
12. *Oberea flavoterminata* sp. nov.

STUDIES IN PHILIPPINE JASSOIDEA: II, PHILIPPINE JASSARIA

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FIVE TEXT FIGURES

The present classification of the jassoid insects is one of the most artificial groupings in the Hemiptera. Groupings have been proposed by various authors, in each case based principally on the Jassoidea[1] of a single country or at least of limited regions. We have had these, more or less varied in detail, for Europe, America, India, and Australasia and Polynesia. Any one of these classifications is largely broken down in attempts to use it for the jassoid insects of the world. But very few generic or even family types have been given thorough anatomical study, the bulk of the genera and even higher groups having been so incompletely described, that their arrangement in a common system, at this time, is next to impossible. Adequate anatomical studies in this superfamily will surely bring about a more natural arrangement, as it has recently done in the Psylloidea. For example, it may justly be said that we know next to nothing of the composition of the thorax of the jassoid insects. Some observations I have made on pleural and sternal sclerites in certain forms indicate that this will be a fruitful subject for study. I have labored for many years simply to bring together enough material from all regions to gain some elementary idea of the broader groupings possible. I estimate that more undescribed species now exist in collections than all previously made known by all authors. It may be imagined how all this coming work will modify our present conceptions of genera. Some of the existing "genera" will completely disappear in this flood of species, while many new genera will have to be erected, this in its turn widely modifying family limits.

[1] It seems that the time is soon coming when the Homoptera by general consent will be divided into the superfamilies Fulgoroidea, Cicadoidea, Cercopioidea, Membracioidea, Jassoidea, Psylloidea, and Coccidoidea. These can then be divided into numerous natural families. Only special students of the group are aware of the enormous extent of the Homoptera, even as imperfectly known as it is at present, and these students, at least, welcome the greater clarity and simplicity possible in the recognition of more numerous families.

At present I am grouping my material in seven families: Ledridæ, Stenocotidæ, Ulopidæ, Tettigoniellidæ, Jassidæ, Koebeliidæ, and Bythoscopidæ. The Ledridæ, if restricted, form a fairly homogeneous group. The Stenocotidæ include the Stenocotinæ, Megophthalminæ (formerly family Paropiidæ), and Signoretiinæ. The Ulopidæ form a passage to the next family. The Tettigoniellidæ include the Hylicinæ, Gyponinæ, Penthimiinæ, and Tettigoniellinæ (with the tribes Ciccini, Tettigoniellini, and Errhomenini). The extensive family Jassidæ [2] includes the Eupelicinæ and Jassinæ; the latter subfamily I divide into 6 tribes: Acocephalini, Cephalelini (with the divisions Cephalelusaria and Hecalusaria), Phrynomorphini (formerly Athysanini) (with the tribes Stegelytraria, Tartessusaria, Selenocephalaria, Phrynomorpharia, and Limotettixaria), Balcluthini (formerly Gnathodini), Eupterygini (formerly Typhlocybini), and Jassini (with the tribes Xestocephalaria and Jassaria). The Koebeliidæ represent an anomalous group showing a strange mixture of relationships. The Bythoscopidæ should be separated into Bythoscopinæ and Eurymelinæ (if included at all). The latter subfamily, having strong membracid affinities, should be examined as to its relationships with the æthalionids.

Taking up the Jassini, we find the tribe, throughout, readily recognizable by the reduced venation, distinctive form of head and thorax, and other general characters. It seems that Xestocephalus should find a place here. Its form, venation, and position of ocelli all find close analogues in this tribe. The genus Macroceratogonia of Kirkaldy indubitably belongs in this tribe and is closely related to Palicus and Neocoelidea. It has nothing clearly to distinguish it but the higher position of the antennæ, and this character is not of tribal value.

The division Thagriaria of Distant seems to be unnecessary, since there are some quite intermediate forms. The logical following out of such a separation would be the recognition, among these genera, of a number of other groups of equal value and all difficult of definition. In Distant's synopsis of genera the diagnostic character used to separate *Guliga* has only a specific value among these insects. Also his alternative group characters for separating *Jassus-Arya* from *Kunasia-Myittana* are both amply

[2] The use of the family name Jassidæ by Stebbing (Amphipoda: Gammaridea) [Das Tierreich 21, 8, 647, 739], for a family of Amphipoda, is untenable. *Jassus* Fabr., as a genus of the Homoptera, dates from 1803, while Jassa Leach of Amphipoda dates from 1814. Fieber had used this family name in the Homoptera in 1866.

represented in endless intergrading conditions in American species of *Jassus*. In the several hundred tropical American species of the genus *Jassus* we might easily separate a large number of genera as good as *Guliga* of Distant. A number of the genera included in this tribe are so described that they cannot be understood without further study and description. For instance, in Kirkaldy's description of *Muirella* he mentions a number of characters not at all generically diagnostic, but fails to mention if an appendix is present or not, and this point is not clearly shown in the accompanying cut. In the same genus he describes the vertex as two and one-half times as long as wide at base, but his figure shows it not twice as long as wide. In this case I have followed the figure.[3]

A provisional synopsis—confessedly imperfect—of the genera of this division will indicate some of the relationships mentioned above. In many respects this synopsis is too artificial, but this cannot be avoided with our incomplete knowledge of some of the genera. For instance, the median pronotal carina should not be used as a primary character, and *Thagria* should fall near *Tharra* and *Soortana*.

Key to the genera of the division Jassaria.[4]

a^1. Fore femora and tibiæ normal.
  b^1. Pronotum not medially carinate or only obsoletely so near anterior margin.
    c^1. Eyes not adjoining front in facial view.
      d^1. Scutellum minute..... Tinobregmus Van D.
      d^2. Scutellum normal to large.
        e^1. Antennal scrobes abnormally high on face, above level of eyes in facial view; antennæ longer than body.
Macroceratogonia Kirk.
        e^2. Antennal scrobes near inner lower angle of eyes.
          f^1. Wings with two apical cells.
            g^1. Clypeus strongly umbonate..... Paracoelidea Baker.
            g^2. Clypeus plane..... Neocoelidea Baker.
          f^2. Wings with three apical cells.
            g^1. Tegmina without an appendix..... Palicus Stål.
            g^2. Tegmina with an appendix.
              h^1. Vertex more or less elongately, usually angularly produced, always longer than width between eyes and usually strongly foveate; front usually very long and narrow.

[3] A specimen of *Muirella*, received from Muir since the above was written, does not agree with either the description or figure, the length of vertex being slightly more than twice interocular width.

[4] Here should also be included the *Doda* of Distant and apparently the *Toba* of Schmidt.

i^2. Vertex but little longer than broad, acutely pointed anteriorly.

j^1. Front very long and narrow, but without angulate ridge above; ocelli near apex of vertex; tegmina truncate apically..... **Varta Dist.**

j^2. Front not long and narrow, but with an angulate ridge above; ocelli not near apex of vertex; tegmina rounded apically..... **Sabima Dist.**

i^3. Vertex little less than twice as long as broad, or longer.

j^1. Vertex with anteocular portion far longer than interocular.

k^1. Anteocular portion of vertex with lateral margins in line with outer margins of eyes.

l^1. Pronotum and vertex medially longitudinally carinate; margins of anteocular portion of vertex sinuate; clypeus narrowed to tip. **Dussana Dist.**

l^2. Pronotum and vertex noncarinate; margins of anteocular portion of vertex straight; clypeus broadened at tip and marginate. **Muirella Kirk.**

k^2. Anteocular portion of vertex greatly contracted within outer eye margins; clypeus narrowed to tip..... **Dharmma Dist.**

j^2. Vertex with anteocular portion far shorter than interocular.

k^1. Front with sides strongly sinuate and distinctly broadened above; lateral carinate margins of vertex parallel as far as to base of vertex, anteriorly curved on to the temples next the eye; front more or less distinctly medially carinate; scutellum longer than vertex.... **Tharra Kirk.**

k^2. Front with sides straight, scarcely broadened above; lateral carinate margins of vertex suddenly converging posteriorly and "terminating in a sulcate process;" front noncarinate; scutellum about as long as vertex..... **Soortana Dist.**

h^2. Vertex but little and very obtusely produced in front of eyes, commonly about as long as broad, never much longer than broad between eyes, sometimes much less.

i^1. Head distinctly narrower than pronotum.

j^1. Head about half the width of pronotum and not as wide as scutellum; vertex about as long as width between eyes, subangulate anteriorly and smooth, noncarinate; ocelli very near eyes.... **Placidus Dist.**

j^2. Head always wider than half pronotum and wider than scutellum; vertex very obtuse and usually carinate medially or laterally or both; ocelli very near eyes.

k^1. Face broader than long; vertex broader than long and far shorter than pronotum; tegmina with 4 apical cells..... **Kunasia Dist.**

k^2. Face always far longer than broad; vertex usually as long as, or longer than, broad; tegmina with 5 apical cells.

l^1. Vertex subangular anteriorly; clypeus medially carinate ..... Guliga Dist.[5]

l^2. Vertex very obtuse anteriorly; clypeus usually noncarinate, except occasionally toward base. Jassus Fabr.

i^2. Head about as wide as pronotum.

j^1. Pronotum slightly emarginate behind; clypeus broadened to tip; tegmina with 2 subapical cells. Arya Dist.

j^2. Pronotum deeply emarginate behind; clypeus narrowed to tip; tegmina with 1 subapical cell. Myittana Dist.

c^2. Eyes broadly adjoining front in facial view; vertex foveate, short angulate anteriorly; pronotum with anterior margin acutely produced between the eyes..... Pugla Dist.

b^2. Pronotum distinctly medially carinate; vertex laterally carinate, twice as long as width between eyes, apically acute, anteocular portion longer than interocular.

c^1. Scutellum longer than pronotum; anteocular portion of vertex with subangulated lateral margins; lateral carinæ of vertex widely separated at base and apex..... Thagria Mel.

c^2. Scutellum shorter than pronotum; anteocular portion of vertex with nearly straight lateral margins; lateral carinæ of vertex converging at base and apex..... Mukwana Dist.

a^2. Fore femora or tibiæ foliaceous or curved.

b^1. Fore femora normal, fore tibiæ curved..... Terulia Stål.

b^2. Fore femora dilated..... Gabrita Kirk. (Petalopoda Spang.)

Genus JASSUS Fabricus

So far as known to me, there are 4 common species of *Jassus* in Luzon.[6] Three of these species were described by Stål and are easily recognized from his descriptions. Apparently the rostrum is distinctly longer in *J. philippinensis* than in *obscurus* or *conspersus*, but it is not clear what Stål refers to as the "last segment," since the divisions of the joints are in part quite obscure.

Drawings of a full-face view in these species does not show at all the exact form of the front. At the antenna the frontal margin is incurved into the basin of the antennal scrobe and there acutely angled. Along the general line of the margin, on the side of the disk of the front at this position, is a sharp

[5] As will be noted by students of this group, the separation of *Guliga* on the characters given is wholly inadequate to establish the genus.

[6] A number of other species from the southern islands will be reported on later.

carina, which gives in a remarkable fashion an appearance in the front view of a continuous lateral margin. This is shown in the figures of the accompanying cuts.

The species group out as Stål suggests, even when various other important characters besides those used by him are taken into consideration. The upper extension of the lora furnishes a character peculiar in the two groups of species. Less clear, but still characteristic, is the form of the lower margin of the antennal cavity between the lora and the eye. In *Jassus obscurus* and *J. conspersus* this is more or less distinctly carinately margined and is slightly curved toward the antenna, making the lower point subacute where it joins the lora. In *J. luzonensis* and *J. philippinensis* there is no carina, the lower margin of the cavity being curved away from the antenna, making the cavity broadly rounded below. *Jassus dubia* Walk., described from the Philippines, is unknown to me, and unrecognizable on account of the inadequate description.

Synopsis of species of Jassus known from Luzon.

a^1. Vertex longer than width between eyes and longer than pronotum; clypeus very strongly broadened apically; tegmina without a costal transparent spot; acute upper tip of lora falling far short of reaching antenna.

b^1. Pronotum and tegmina clear black, vertex piceous; face clear dark brown; hind margin of last ventral segment of female truncate medially, slightly incurved laterally..... obscurus Stål.

b^2. Pronotum and tegmina brown and thickly yellow granulate, the vertex yellow; front yellow, laterally brownish to reddish; hind margin of last ventral segment of female subtruncate medially, very strongly and suddenly bisinuate laterally..... conspersus Stål.

a^2. Vertex shorter than width between eyes and shorter than pronotum; clypeus not very strongly broadened apically; tegmina with a costal transparent spot; acute upper tip of lora reaching antenna.

b^1. Tegmina thickly yellowish granulate and without discal yellowish spots; front brown, thickly yellow-dotted; ocelli nearer to eyes than to median line; scutellum small; hind margin of last ventral segment of female strongly produced, medially broadly emarginate, angles of emargination acute..... luzonensis sp. nov.

b^2. Tegmina without yellowish granulations, but with several discal yellowish spots; front brownish, lower two thirds medially yellowish; ocelli nearer to median line than to eyes; scutellum very large; hind margin of last ventral segment gently sinuate.

philippinensis Stål.

Jassus obscurus Stål.

This large species, with tegmina unicolorous blackish, and with under parts unicolorous brownish, is the most readily recognized species in this region. The propleura, below the carina, presents a remarkable character in that the anterior

half is finely shagreened, the posterior half being long-ovally and sharply depressed, almost foveate; this area rugose. Vertex with a strong sharp continuous median carina, and with deep interocular depressions on either side of median carina, leaving strong folds next eye, which, passing forward, bend suddenly from eyes to apex of vertex, and posteriorly gradually converge along lines of eye margins to posterior margins of vertex near the median carina. Pronotum and anterior area of scutellum tuberculate, but not at all rugose; posterior area of scutellum distinctly longer than wide and obscurely transversely wrinkled. Tegmina frequently with a whitish bloom.

LUZON, Laguna, Mount Maquiling (*Baker*). Frequent, and apparently a forest inhabitant.

Jassus conspersus Stål.

This species is well marked by the numerous yellowish dots and the reddish or brownish lateral stripes of the front.

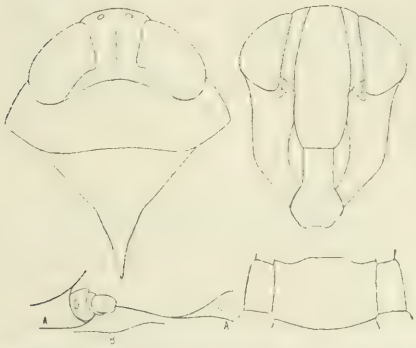

FIG. 1. *Jasus obscurus* Stål. A—A, lateral margin of front; B, carina forming false frontal margin; C, lora; D, antenna.

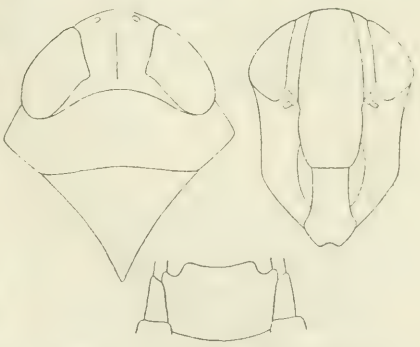

FIG. 2. *Jassus conspersus* Stål.

The propleuræ below the carinæ are only slightly concave posteriorly where they are narrowly wrinkled, the remainder of the surface being thickly coarsely shagreened. Structure of vertex totally different from that of *J. obscurus*. The median carina becomes obsolete anteriorly; the lateral folds are only distinct posteriorly where they join the posterior margin distant from median carina; disk of vertex anteriorly not at all or only slightly depressed, but with strong oblique rugæ which converge at apex of vertex; disk posteriorly with 2 depressions, each midway between carina and lateral fold. Pronotum and anterior fold of scutellum with large tubercles, and the former also transversely subobsoletely wrinkled. Tegmina frequently with a strong greenish tinge.

LUZON, Laguna, Los Baños and Mount Maquiling (*Baker*). Abundant.

Jassus luzonensis sp. nov.

Vertex and fore and middle legs yellowish, remainder dark brown. Pleuræ black, borders of abdominal tergites narrowly yellowish. Wings smoky. Front and basal portion of clypeus with numerous small round yellowish dots. Pronotum strongly yellow tuberculate. Tegmina with numerous yellow interruptions on the veins; membrane within the cells basally, with a few small irregular dots. A small yellowish dash at two thirds of the costal margin and a more indistinct yellowish mark across the 2 outer apical cells. Length, ♂ 7, ♀ 8 mm.

Clypeus but little expanded apically, the apical margin depressed and roughened. Front, length not twice its greatest

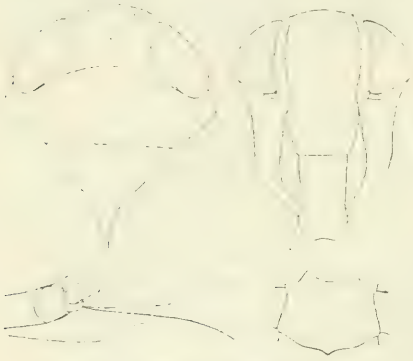

FIG. 3. *Jassus luzonensis* sp. nov.

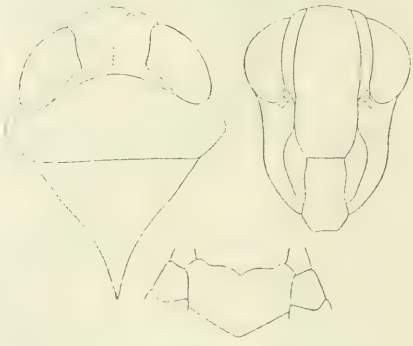

FIG. 4. *Jassus philippinensis* Stål.

width, its surface, with that of clypeus except apical margin, coarsely evenly shagreened. Loræ acutely extended above to antennæ, their surface, with that of genæ, minutely rugose. Vertex shorter and broader than in other Philippine species, length but little less than width between eyes; surface broadly depressed on either side, without distinct ocular fold; median carina double, forming a very slender median sulcus; surface rugose, the rugosities, anteriorly, converging obliquely to tip. Ocelli slightly nearer to eyes than to median line. Width of pronotum two and two thirds its length, with a vestige of a median carina anteriorly, strongly tuberculate but without rugæ; lateral carina somewhat incomplete, below this shagreened except the slightly roughened posterior border. Surface of scutellum slightly roughened and with a few yellowish dots. Hind margin of last ventral segment of female somewhat ex-

tended, slightly emarginate between 2 acute projections, lateral to which the margin is suddenly oblique.

LUZON, Laguna, Los Baños and Mount Maquiling (*Baker*).

The splitting of the median carina of vertex, so distinct in this species, is very faintly suggested in *J. conspersus.*

Jassus philippinensis Stål.

Easily recognized by the large pale transverse spots on apical two thirds of tegmina, which, however, entirely lacks yellowish interruptions on the veins. Face brownish above; below, with fore and middle legs, yellowish. The males are uniformly a little paler in general color than the females. The propleuræ are largely shagreened and have 2 small smoother areas posteriorly. Structure of vertex very similar to that of *J. luzonensis,* but here the central raised sulcus is still more marked and much wider posteriorly, and the rugæ on the surface of vertex are stronger. The tubercles on the pronotum are weak, their color running together in transverse groups, the surface between not rugose. Scutellum nearly smooth. Tegmina very smooth.

LUZON, Laguna, Los Baños and Mount Maquiling (*Baker*). Abundant.

Genus **THARRA** Kirkaldy

On the mossy-forest summit of Mount Maquiling at 3,600 feet altitude we find abundant a very peculiar member of this division, evidently not a true *Jassus,* which I at first took to represent a new genus near *Soortana* of Distant. I had been unable to get any clear understanding of the *Tharra* of Kirkaldy, but it appears plain now that this species pertains to that generic group. The venational characters given for the genus by Kirkaldy are without generic significance. A figure published by the Hawaiian Sugar Planters' Association[7] is apparently intended to illustrate a member of this genus, although I can find no reference to it in the text. The figure, however, shows well the remarkable structure of the head. The species previously described are all Fijian and Australian, and it is a most interesting discovery to find a representative in Luzon. Others will doubtless be found in intervening islands.[8] Evidently our species closely resembles *T. labena,* the type of the genus, from Queensland.

[7] *Bull. Hawaiian Sugar Plant. Assoc., Div. Ent.* (1907), 3, Pl. II, fig. 16.

[8] Collection made since the above was written show peculiar species to exist in Negros and Mindanao, and others in Luzon.

Tharra carinata sp. nov.

Pronotum pale brownish, with minute indistinct darker markings. Scutellum, vertex, face, sternum, and legs, pale yellowish; scutellum with basal angles, two discal spots, and incised transverse line, dark; point of vertex carmine; antennal scrobes, band across anterior coxæ, and hind tarsi, dark. Abdomen yellowish, the incisures above, and all below apically, dark. Tegmina brown, tip narrowly whitish translucent, the veins red, nearly every cell with a small irregular whitish translucent spot on its disk. Costal margin with 3 translucent spots on its basal half and a much larger costal spot on its apical half. Length, ♂ 6, ♀ 6.5 millimeters.

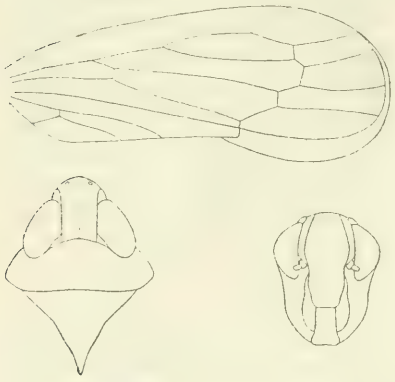

FIG. 5. *Tharra carinata* sp. nov.

Clypeus slightly expanded distally, the apex not emarginate. The whole face is evenly finely shagreened. Front a little more than twice its greatest width, medially finely but distinctly carinate. Loræ suddenly acutely extended above but not reaching antennæ. Length of vertex one and three fourths times width between eyes, with sharp and high lateral carinæ, which are nearly parallel and anteriorly curve down on to the temples, reaching the antennal scrobes; the median carina is distinct only posteriorly, disk depressed, its surface strongly sublongitudinally rugose, anteriorly the rugæ bend obliquely toward the apex. Ocelli nearer to median line than to eyes. Pronotum nearly three times wider than long, not at all tuberculate, but minutely rather sparsely pitted and roughened, and with a subobsolete median carina. Lateral carina of pronotum entire, below this shining, the upper part minutely roughened. Scutellum shagreened nearly throughout. Hind margin of last ventral segment of female truncate.

LUZON, Laguna, summit of Mount Maquiling (*Baker*).

ILLUSTRATIONS

TEXT FIGURES

FIG. 1. *Jassus obscurus* Stål.
2. *Jassus conspersus* Stål.
3. *Jassus luzonensis* sp. nov.
4. *Jassus philippinensis* Stål.
5. *Tharra carinata* sp. nov.

PROSPETTO DEI GRILLACRIDI DELLE ISOLE FILIPPINE

Pel Achille Griffini

CON UNA TAVOLA

In parecchi miei lavori pubblicati nell'ultimo quinquennio, e che si troveranno elencati nell'indice bibliografico che accompagna il presente articolo, avevo già avuto occasione di occuparmi di Grillacridi delle Filippine; una gran parte anzi delle specie abitanti codeste isole fu da me riscontrata e studiata nelle collezioni comunicatemi da molti Musei.

Pertanto ho subito accolta con piacere la proposizione fattami dai Signori Entomologi delle Filippine perchè io scrivessi per questo importante periodico scientifico un Prospetto dei Grillacridi Filippinensi, analogo a quelli, in vario modo redatti, che ho già pubblicati intorno a diversi altri gruppi di Grillacridi.

Veggansi, ad esempio, i miei studi riassuntivi sul gen. *Hyperbaenus*;[1] sul gen. *Neanias*,[2] sui Grillacridi africani,[3] sulle *Gryllacris americane*,[4] su quelle di Madagascar,[5] sulle hyalinofasciatae,[6] sulle *Gryllacris* abitanti la Nuova Guinea,[7] su quelle di Giava,[8] su quelle di Borneo,[9] e su quelle del Tonkino.[10]

Però, mentre avevo potuto aver in esame i tipi delle *Gryllacris* filippiniche descritte da Stål e da Navàs, e mentre potevo rendermi conto esattamente delle specie descritte da Brunner, studiando le sue buone diagnosi, mi occorreva assolutamente possedere qualche migliore cognizione delle specie state imperfettamente descritte da Walker.

[1] Giornale *Redia*, Firenze (1911), 7.

[2] Le specie africane del gen. *Neanias* Br., *Zool. Jahrb.*, Jena (1911), 31. Le specie orientali del gen. *Neanias* Br., *Wien. ent. Zeitg.* (1914).

[3] *Bollett. Mus. zool. anat. compar. Torino* (1911), 26, No. 634.

[4] Giornale *Redia*, Firenze (1909), 6; *Bollett. Mus. zool. anat. compar. Torino* (1911), 26, No. 639.

[5] *Zool. Anzeiger*, Leipzig (1910), 35.

[6] *Atti Soc. ital. scienze natur. Milano* (1910), 49.

[7] *Zool. Anzeiger*, Leipzig (1911), 37.

[8] *Tijdschr. voor Ent.*, S. Gravenhage (1913), 56.

[9] *Sarawak Mus. Journ.*, Singapore (1912), 1, No. 2.

[10] *Zool. Jahrb.*, Jena (1914).

Queste sono le seguenti: *Gryllacris nasalis, Gr. vittipes, Gr. arctata.* I loro tipi si conservano al British Museum e non si possono avere in communicazione.

Pertanto mi rivolsi alla cortesia del Dr. Meade-Waldo, assistente al British Museum, pregandolo di voler far eseguire per mio conto e di farmi avere le fotografie dei suddetti tre tipi di Walker. Egli gentilmente me le procurò con molta premura, ed eseguite in modo assai soddisfacente, per il che ancor quì gli rivolgo i miei migliori ringraziamenti.

Credo anzi utile pubblicare nel presente lavoro una riproduzione in grandezza naturale delle figure fotografiche di quei tre tipi, potendo esse riuscire utili agli studiosi. L'esame di tali fotografie mostra che i tipi sono in mediocre stato di conservazione e di preparazione, ma può tuttavia far comprendere che cosa sono queste specie, ciò che dalle incomplete ed anche erronee descrizioni di Walker non risultava possibile.

La *Gr. nasalis* e la *Gr. vittipes* si veggono appartenere alle hyalino-fasciatae; questo, dall'opera di Walker, non appariva chiaramente per la *Gr. vittipes* che l'autore aveva collocato fra le fusco-fasciatae, comparandola anzi colla *Gr. signifera* Stoll (= *maculicollis* Serv.); lo stesso fatto poi non risultava assolutamente per la *Gr. nasalis,* le cui ali sono erroneamente da Walker dette pallide cineree e persino con vene trasversali oscure (gruppo *bbb* di Walker), mentre dalla fotografia si vedrà subito come sieno brune con vene trasversali pallide e marginate da fascie pallide.

Così la *Gr. nasalis* Walk. viene a constatarsi sinonima della *Gr. biguttata* Stål, godendo anzi del diritto di priorità, como io avevo già supposto in alcuni miei lavori, nei quali facevo ogni riserva sulla espressioni di "alae posticae cinereae" usata da Walker nella descrizione della *Gr. nasalis* come in quelle di varie altre specie aventi le ali colorate e variegate nei modi i più differenti.[12] Dall'esame della fotografia del tipo della *Gr. arctata* Walk. appare che questa è realmente sinonima della *Gr. brevispina* Stål, come già aveva concluso el Kirby,[13] ciò che, prima di conoscere il tipo e stando alla sola descrizione di Walker, io finora non avevo accettato che con riserva.

Posto ciò in chiaro, posso dunque tracciare il mio Prospetto dei Grillacridi delle Filippine.

[12] Walker descrive come cineree anche le ali della *Gr. nobilis* che sono invece brune col centro di ciascuna areola nettamente ialino, e quelle della *Gr. armata* che sono invece gialliccie con macchiette nerastre sulle venule.

[13] Synonym. Catalogue of Orthoptera, London (1906), 2.

Dispositio specierum Gryllacridarum philippinensium.

a^1. Corpus in adultis apterum. Statura minore: capite, pedibus, ventre necnon lateribus corporis rufo-testaceis; abdominis dorso piceo-castaneo; prothoracis, mesothoracis metathoracisque dorso piceo-castaneo sed in medio longitudinaliter late rufo-testaceo.

1. **Neanias philippinus** Griff.

a^2. Corpus in adultis perfecte alatum.

b^1. Alae posticae bicolores, seu fusco et hyalino variae: fuscae hyalino-fasciatae, vel fuscae hyalino-areolatae, vel hyalinae fusco-fasciatae.

c^1. Alae posticae maxima pro parte dilute fusco tinctae, fere subhyalinae, tantum margine externo areolis totis fuscis, caeterum areolis subhyalinis venulis fuscis utrimque dilute fusco marginatis, parte subhyalina areolarum et fasciis fuscis haud definite limitatis. Caput concolor ferrugineum; pronotum ferrugineum, atro-fusco trimaculatum.

2. **Gryllacris nigripennis** Gerst. subsp. **trimaculata** Griff.

c^2. Notae alarum et corporis haud ut in c^1.

d^1. Alae posticae hyalinae fusco-fasciatae (seu venulis fuscis utrimque fusco marginatis) vel fuscae hyalino-areolatae (seu colore fusco utrimque venulas fuscas marginante magis in areolis expanso, tantum centrum areolarum subrotunde et angustiuscule hyalinum liberante).

e^1. Alae posticae hyalinae, nitide fusco-fasciatae. Pronotum lineis atro-fuscis pictum. Tibiae omnes superne infuscatae.

3. **Gryllacris obscura** Brunner var.

e^2. Alae posticae fuscae hyalino-areolatae. Elytra venulis dimidii apicalis campi postici leviter infuscatis.

f^1. Caput et pronotum ferruginea nebulosa, facie leviter fusciori; pedes ferruginei nebulosi..... 4. **Gryllacris pustulata** Stål.

f^2. Caput aterrimum, tantum occipite et parte postica genarum castaneis. Pronotum atro-piceum tantum gibbulis lateralibus castaneis. Femora antica latere basi castanea, supra subtusque et ad apicem atro-picea; femora postica castanea superne usque fere ad apicem testacea, apice atro; tibiae omnes atratae.

5. **Gryllacris pustulata** subsp. **mindorensis** Griff.

d^2. Alae posticae fuscae hyalino-fasciatae; seu areolis omnibus vel fere omnibus fuscis, venulis transversis pallidis utrimque hyalino vel hyalino-testaceo marginatis.

g^1. Elytra basi ad marginem anticum macula magna nigro-cyanea, azureo nitente, longiori quam latiori, irregulari, ornata. Haec macula marginibus antico et postico pluries incisis. Maculae obscurae parvae nonnullae interdum post eam conspiciuntur. Femora postica basi parum incrassata.

h^1. Caput ferrugineum facie fusciori, macula ocellari frontali permagna citrina, optime delineata. Lamina subgenitalis ♀ subtriangularis, valde latior quam longior, vertice rotundato, leviter tumido..... 6. **Gryllacris maculipennis** Stål.

h^2. Caput testaceum sine maculis ocellaribus distinguendis. Macula nigro-cyanea elytrorum magis evoluta. Lamina subgenitalis ♀ subtrapetioidalis elongata, apice attenuata ibique bidentata et inter dentes sinuata.

7. **Gryllacris maculipennis** var. **bakeri** nom. nov.

g^2. Elytra macula magna nigro-cyanea destituta.

i^1. Corpus statura permagna; testaceo-ferrugineum incerte nebulosum, pedibus leviter pallidioribus, apice femorum inferius atro, macula utrimque apicali tibiarum atra, spinis pedum posticorum atris, lobis tarsorum omnium atris. Elytra areolis paucis mediis dilute infuscatis. Ovipositor breviusculus, valde falcato-incurvus.

8. Gryllacris princeps Stål.

i^2. Corpus statura modica vel sat maiore, haud tamen permagna. Notae haud ut in i^1.

j^1. (Secundum Walker) Femora nigro vittata. Corpus testaceum. Elytra venis concoloribus. Mandibulae nigrae. Antennae piceae, basi testaceae.

9. Gryllacris vittipes Walker.

j^2. Femora haud nigro vittata. Antennae totae testaceae.

k^1. Frons cum labro atra, macula ocelliformi flava orbiculari maxima. Pronotum unicolor ferrugineum. Elytra ferruginea versus marginem anticum dilute infumata venulis transversis pallidis. (Teste Brunner.)

10. Gryllacris moesta Brunner.

k^2. Labrum nigrum nitidum sed frons testaceo-ferruginea, maculis ocellaribus non distinguendis. Elytra testacea, venis venulisque concoloribus.

l^1. Pronotum utrimque macula magna atra ornatum. Tibiae omnes post basim usque ad medium plus minusve dilute brunneae.

11. Gryllacris nasalis Walker.

l^2. Pronotum utrimque macula magna atra destitutum. Tibiae pallidae.

12. Gryllacris nasalis var. detersa Griff.

b^2. Alae posticae unicolores, hyaline vel subhyalinae, venis venulisque subtilibus pallidis vel fuscis, colore a hyalino areolarum distincto non marginatis. Corpus statura mediocri vel minori.

m^1. Elytra (et alae) elongata. Elytra longitudine 24–25 mm., apicem femorum posticorum optime superantia, subhyalina, leviter testaceo tincta, venis venulisque concoloribus pallidis. Sutura inter fastigia capitis et sutura clypeo-frontalis piceo tinctae, necnon vittae duae a sutura supera descendentes inferiusque evanidae ad latera maculae ocellaris frontalis picescentes. Spinae pedum breviusculae..... **13. Gryllacris arctata** Walker.

m^2. Elytra et alae apicem abdominis et femorum posticorum non attingentia.

n^1. Corpus statura parva, graciliusculum, ferrugineo-fulvum, facie punctis 6 nigris fere in circulum dispositis ornata. Elytra sat parva et opaca, longitudine 11–12 mm., crebre venosa; alae vitreae, venis venulisque pallidis. Ovipositor gracilis, subrectus ..... **14. Gryllacris punctifrons** Stål.

n^2. Notae haud ut in n^1. Facies punctis 6 nigris in circulum dispositis destituta. Elytra longitudine 16–20 mm.; alae hyalinae vel subhyalinae, fusco venosae.

o^1. Genicula atrata, seu femorum apex et basis tibiarum atrata. Tibiae posticae atro spinulosae.

p^1. Pronotum flavidum, circumcirca atro marginatum. Caput totum vel subtotum atrum.

q^1. Elytra testacea apice subpellucida, venis venulisque concoloribus vel leviter fuscioribus. Labrum nigrum. Spina coxarum anticarum nigra. Pleurae fuscae. Femora omnia subtus nigra nitida; postica in utroque margine spinulis 7–8 ..... **15. Gryllacris limbaticollis** Stål.

q^2. Elytra tantum campo antico (minore) subhyalino, campo postico toto atro, tantum apicem versus leviter grisescente, venis venulisque atris. Labrum ferrugineum. Spina coxarum anticarum et pleurae flavidae. Femora omnia, excepto geniculo, supra subtusque flavido-testacea; postica margine externo spinulis 6–8, margine interno spinulis 11–12..... **16. Gryllacris isseli** Griff.

p^2. Pronotum testaceum fusco lineatum. Caput testaceum, occipite et fastigio verticis fusco maculatis. Elytra testacea, venis venulisque fuscis. Femora postica margine externo spinulis 8, margine interno conferte spinuloso. (Teste Brunner.)..... **17. Gryllacris nigrogeniculata** Brunner.

o^2. Femora tota fulvo-testacea, margine externo spinulis 6–8, margine interno spinulis 11–13. Elytra subhyalina vel levissime testaceo aut griseo infumata, venis venulisque fuscis vel fuscescentibus.

r^1. Tibiae omnes plus quam dimidio basali fuscae vel nigrae; posticae usque parum ante apicem nigrae, atro spinosae.

s^1. Caput ferrugineum fusco varium, vertice atro. Pronotum ferrugineum, vitta atra medio coarctata, posterius plus minusve evanida, ornatum.. **18. Gryllacris fuscinervis** Stål.

s^2. Caput et pronotum tota ferruginea nebulosa. **19. Gryllacris brachyptera** Gerstaecker.

r^2. Tibiae, ut femora, totae fulvo-testaceae; posticae spinis tantum fuscis, basi pallidioribus, sed interdum basi subtus nigro-fusco cinctis. Caput et pronotum testaceo-ferruginea nebulosa.

t^1. Pronotum maculis duabus parvis anterioribus fuscis ornatum. Spinae tibiarum posticarum basi subtus nigro-fusco cincta. Elytra campo antico dimidio basali subhyalino, ibique vena unica obliqua distincta. **20. Gryllacris plebeia** Stål.

t^2. Pronotum maculis 2 anterioribus fuscis destitutum. Spinae tibiarum posticarum basi subtus haud nigro-fusco cincta. Elytra campo antico venis tribus distinctis praedito. **21. Gryllacris plebeia** var. **immaculata** Griff.

OSSERVAZIONI SULLE VARIE SPECIE

Genus **NEANIAS** (Brunner) Griffini 1914

Neanias philippinus Griff.

Eremus philippinus GRIFFINI, Atti Soc. ital. scienze natur. Milano (1908), **47**, 9–10; ibid (1911), **50**, 239.

Neanias philippinus GRIFFINI, Wien. ent. Zeitg. (1914), **33**.

Habitat: Philippinae; Nagasaki (typus unicus, ♂, in Musaeo Berolinense).

Genus **GRYLLACRIS** Serville

Gryllacris nigripennis Gerst. subsp. trimaculata Griff.

Gryllacris nigripennis GERST., subsp. *trimaculata* GRIFF., Ann. Mus. nation. hungarici, Budapest (1913), 11, 294–296.

Habitat: Philippinae, Mindoro (typus unicus, ♂, in Musaeo Budapesti).

La specie tipica e le sue sottospecie *Gr. elongata* Fritze in Carl e *Gr. alivittata* Griff. abitano la regione malese: Malacca, Sumatra, Malabar, Java, Borneo; nelle ali della subsp. *Gr. trimaculata* manca la lineetta ialina contigua a ciascuna venula oscura, che esiste invece in quelle.

Gryllacris obscura Brunner var.

Gryllacris signifera var. GRIFFINI, Bollett. Mus. zool. anat. compar. Torino (1908), 23. No. 587, 10.

Gryllacris obscura var. GRIFFINI, Ann. Mus. civ. Genova (1911), III, 5, 100–102.

Habitat: Philippinae, Mindanao (specimen philippinicum unicum, ♂, in collectione mea).

La specie tipica e questa stessa sua varietà meno comune, avente le ali nettamente fusco-fasciate, abitano la regione malese, con altre varietà di cui la più comune nelle collezioni è la var. *Gr. sumatrana* Griff.

L'insolita ornamentazione delle ali mi aveva fatto dapprima riferire l'esemplare delle Filippine come varietà alla *Gr. signifera* Stoll; migliori studi e varie considerazioni però mi hanno indotto a ritenerlo, con altri esemplari malesi ad esso simili, una varietà della *Gr. obscura* Br.

Mi sorprende però molto il fatto che in nessuna collezione io non ho mai visti altri individui filippinensi nè di questa varietà nè della specie stessa, e ciò mi fa talora dubitare dell'esattezza dell'indicazione di provenienza annessa all'esemplare della mia collezione vendutomi nel 1908 da Bang-Haas.

Gryllacris pustulata Stål.

Gryllacris pustulata STÅL, Oefvers. k. Vetensk. Akad. Förhandlingar, Stockholm (1877), No. 9, 47. KIRBY, Synonym. Catalogue of Orthoptera, London (1906), 2. 145. GRIFFINI, Atti Soc. ital. scienze natur. Milano (1909), 48, 82–84.

Habitat: Philippinae; Taganito (typus unicus, ♀, in Musaeo Stockholmiae, a me rursus descriptus).

Specie dimenticata da Brunner.

Gryllacris pustulata subsp. mindorensis Griff.

Gryllacris pustulata subsp. *mindorensis* GRIFF., Ann. Mus. nation. hungarici, Budapest (1913), **11**, 292–294.

Habitat: Philippinae, Mindoro (typus unicus, ♂, in Musaeo Budapesti).

Gryllacris maculipennis Stål.

Gryllacris maculipennis STÅL, Oefvers. k. Vetensk. Akad. Förhandlingar, Stockholm (1877), No. 9, 47, ♂. BRUNNER, Verhandl. k. k. Zool.-bot. Ges. Wien (1888), **38**, 348, ♀. KIRBY, Synonym. Catalogue of Orthoptera, London (1906), **2**, 143. GRIFFINI, Atti Soc. ital. scienze natur. Milano (1909), **48**, 78–81; ibid (1910), **49**, 14; Bollett. Mus. zool. anat. compar. Torino (1913), **28**, No. 668, 5–6.

Habitat: Philippinae; Avayas (typus Ståli, ♂, in Musaeo Stockholmiae, a me rursus descriptus); Philippinae (Brunner), Los Baños (in collectione Bakeri).

Gryllacris maculipennis var. bakeri nom. nov.

Gryllacris maculipennis var. GRIFF., Atti Soc. ital. scienze natur. Milano (1909), **48**, 81–82; Rev. suisse zool., Genève (1909), 390; Atti Soc. ital. scienze natur., Milano (1910), **49**, 14.

Habitat: Philippinae (typus, ♀, in Musaeo Genavense, a me descriptus).

Dopo aver visto la ♀ di Los Baños ben corrispondente alla specie tipica, credo si deva distinguere con un nome particolare questa varietà così rimarchevole. Mi procuro dunque il piacere di dedicarla al sig. Prof. C. F. Baker, agronomo a Los Baños.

Gryllacris princeps Stål.

Gryllacris princeps STÅL, Oefvers. k. Vetensk. Akad. Förhandlingar, Stockholm (1877), No. 9, 47. BRUNNER, Verhandl. k. k. Zool.-bot. Ges. Wien (1888), **38**, 346. KIRBY, Synonym. Catalogue of Orthoptera, London (1906), **2**, 143. GRIFFINI, Atti Soc. ital. scienze natur. Milano (1909), **48**, 72–74; ibid. (1910), **49**, 13.

Habitat: Philippinae (typus unicus, ♀, in Musaeo Stockholmiae, a me rursus descriptus).

Gryllacris vittipes Walker.

Gryllacris vittipes WALKER, Catalogue of the spec. of Dermaptera Saltatoria, Brit. Mus., London (1869), 168–169. KIRBY, Synonym. Catalogue of Orthoptera, London (1906), **2**, 141. Nec *Gr. vittipes* Griff., Nuovi studi sopra div. Grillacridi del Mus. Naz. di Budapest, Ann. Mus. nation. hungarici, Budapest (1906), **9**, 172–173.

Habitat: Philippinae (typus unicus, ♀, in Musaeo Britannico, hic figuratus fig. 1 V).

Per ben conoscere questa specie sarà necessaria una accurata revisione del tipo ed una nuova descrizione precisa di tutti i suoi principali caratteri.

Gryllacris moesta Brunner.

Gryllacris moesta BRUNNER, Verhandl. k. k. Zool.-bot. Ges. Wien (1888), **38**, 346–347. KIRBY, Synonym. Catalogue of Orthoptera, London (1906), **2**, 143. GRIFFINI, Atti Soc. ital. scienze natur. Milano (1910), **49**, 13.

Habitat: Philippinae (typus unicus, ♂, in collectione Brunneri, quem non vidi).

Gryllacris nasalis Walker.

Gryllacris nasalis WALKER, Catalogue of the spec. of Dermaptera Saltatoria, Brit. Mus., London (1869), 183. KIRBY, Synonym. Catalogue of Orthoptera, London (1906), **2**, 141.

Gryllacris biguttata STÅL, Oefvers. k. Vetensk. Akad. Förhandlingar, Stockholm (1877), No. 9, 47. Brunner, Verhandl. k. k. Zool.-bot. Ges. Wien (1888), **38**, 346. KIRBY, Synonym. Catalogue of Orthoptera, London (1906), **2**, 143. GRIFFINI, Atti Soc. ital. scienze natur. Milano (1909), **48**, 74–78; Rev. suisse zool., Genève (1909), **17**, 390; Atti Soc. ital. scienze natur. Milano (1910), **49**, 14; Wien. ent. Zeitg. (1913), **32**, 239–240.

Habitat: Philippinae (typus Walkeri, ♀, in Musaeo Britannico, hic figuratus fig. 1 N); Philippinae (typus Ståli ♀, in Musaeo Stockholmiae, a me rursus descriptus); Manila (specimen ♀, Musaei Genavensis).

Ho qui stabilita finalmente la sinonimia della *Gr. biguttata* Stål colla *Gr. nasalis* Walk.

Gryllacris nasalis var. detersa Griff.

Gryllacris biguttata var. *detersa* GRIFF., Wien. ent. Zeitg. (1913), **32**, 241–242.

Habitat: Philippinae, Luzon (typus unicus, ♂, in collectione Bakeri).

Gryllacris arctata Walker.

Gryllacris arctata WALKER, Catalogue of the spec. of Dermaptera Saltatoria, Brit. Mus., London (1869), 184. KIRBY, Catalogue of Orthoptera, London (1906), **2**, 140.

Gryllacris brevispina STÅL, Oefvers. k. Vetensk. Akad. Förhandlingar, Stockholm (1877), No. 9, 48. GRIFFINI, Atti Soc. ital. scienze natur. Milano (1909), **48**, 97–99.

Habitat: Philippinae (typus Walkeri, ♀, in Musaeo Britannico, hic figuratus fig. 2 A); Philippinae (typus Stål, ♂, in Musaeo Stockholmiae, a me rursus descriptus).

Confermo la sinonimia già stabilita da Kirby fra la *Gr. arctata* Walk. e la *Gr. brevispina* Stål.

Questa specie fu dimenticata da Brunner.

Gryllacris punctifrons Stål.

Gryllacris punctifrons STÅL, Oefvers. k. Vetensk. Akad. Förhandlingar, Stockholm (1877), No. 9, 48. KIRBY, Synonym. Catalogue of Orthoptera, London (1906), 2, 140 (delenda synonymia errata cum *Gr. nigrogeniculata* Br.). GRIFFINI, Atti Soc. ital. scienze natur. Milano (1909), **48**, 94–96; Bollett. Mus. zool. anat. compar. Torino (1913), **28**, No. 668, 6–7.

Habitat: Philippinae, Barrio de Biting (typus Ståli, ♀, in Musaeo Stockholmiae, a me rursus descriptus), Los Baños (specimina 2, ♀, in collectione Bakeri).

Specie dimenticata da Brunner.

Gryllacris limbaticollis Stål.

Gryllacris limbaticollis STÅL, Oefvers. k. Vetensk. Akad. Förhandlingar, Stockholm (1877), No. 9, 47. KIRBY, Synonym. Catalogue of Orthoptera, London (1906), 2, 141. GRIFFINI, Atti Soc. ital. scienze natur. Milano (1909), **48**, 85–87; Ann. Mus. nation. hungarici, Budapest (1913), **11**, 303.

Habitat: Philippinae, Dugang (typus unicus, ♂, in Musaeo Stockholmiae, a me rursus descriptus).

Specie dimenticata da Brunner.

Gryllacris isseli Griffini.

Gryllacris isseli GRIFFINI, Ann. Mus. nation. hungarici, Budapest (1913), **11**, 299–303.

Habitat: Philippinae, Samar (typus unicus, ♂, in Musaeo Budapesti).

Gryllacris nigrogeniculata Brunner.

Gryllacris nigrogeniculata BRUNNER, Verhandl. k. k. Zool.-bot. Ges. Wien (1888), **38**, 330. GRIFFINI, Ann. Mus. nation. hungarici, Budapest (1913), **11**, 303.

Habitat: Philippinae, Manila (typus unicus, ♂, in collectione Brunneri, quem non vidi).

Come ho già fatto notare, il Kirby ha erroneamente considerata questa specie come sinonima della *Gr. punctifrons* Stål.

Gryllacris fuscinervis Stål.

Gryllacris fuscinervis STÅL, Oefvers. k. Vetensk. Akad. Förhandlingar, Stockholm (1877), No. 9, 47. BRUNNER, Verhandl. k. k. Zool.-bot. Ges. Wien (1888), **38**, 333. KIRBY, Synonym. Catalogue of Orthoptera, London (1906), **2**, 141. GRIFFINI, Atti Soc. ital. scienze natur. Milano (1909), **48**, 88–91; Ann. Mus. nation. hungarici, Budapest (1913), **11**, 304.

Gryllacris scripta NAVÀS, Bolet. Socied. aragon. cienc. natur., Zaragoza (1904), 3, No. 5–6, 5–6; ibid. (1909), 8, No. 5, 103–104. KIRBY, Synonym. Catalogue of Orthoptera, London (1906), 2, 140.

Habitat: Philippinae (typus Ståli, ♂, in Musaeo Stockholmiae, a me rursus descriptus), Mindanao, Zamboanga (typus Navasi, ♂, a me visus).

La sinonimia della *Gr. scripta* Nav. colla *Gr. fuscinervis* Stål fu da me definitivamente stabilita nel 1913.

Gryllacris brachyptera Gerstaecker.

Gryllacris brachyptera GERSTAECKER, Arch. f. Naturgesch. (1860), 26, 269. BRUNNER, Verhandl. k. k. Bot. Ges. Wien (1888), 38, 331–332. KIRBY, Synonym. Catalogue of Orthoptera, London (1906), 2, 140. GRIFFINI, Ann. Mus. nation. hungarici, Budapest (1913), 11, 296–299, 304. Nec *Gr. brachyptera* Griffini intorno ad alc. *Gryllacris* di Sumatra e di isole vicine; Ann. Mus. civ. storia natur. Genova (1908), III, 4, 9.

Habitat: Philippinae, Luzon (Gerstaecker); Mindoro (♀ unica a me visa, Mus. Budapesti).

Gryllacris plebeia Stål.

Gryllacris plebeia STÅL, Oefvers. k. Vetensk. Akad. Förhandlingar, Stockholm (1877), No. 9, 47. BRUNNER, Verhandl. k. k. Zool.-bot. Ges. Wien (1888), 38, 334. KIRBY, Synonym. Catalogue of Orthoptera, London (1906), 2, 141. GRIFFINI, Atti. Soc. ital. scienze natur. Milano (1909), 48, 91–93; Ann. Mus. nation. hungarici, Budapest (1913), 11, 304.

Habitat: Philippinae, Antipolo (typus unicus, ♂, in Musaeo Stockholmiae, a me rursus descriptus).

Gryllacris plebeia var. immaculata Griffini.

Gryllacris plebeia var. *immaculata* GRIFFINI, Bollett. Mus. zool. anat. compar. Torino (1913), 28, No. 668, 7–8.

Habitat: Philippinae, Los Baños (*Baker;* typus unicus, ♂, in collectione Bureau of Science, Manila).

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SPIEGAZIONE DELLA TAVOLA

TAVOLA I

FIG. 1. V. *Gryllacris vittipes* Walker. Typus.
N. *Gryllacris nasalis* Walker. Typus.
2. A. *Gryllacris arctata* Walker. Typus.

Fig. 1. V. Gryllacris vittipes Walker. Typus. N. Gryllacris nasalis Walker. Typus.

Fig. 2. A. Gryllacris arotata Walker. Typus.

TAVOLA I.

NEUE ORIENTALISCHE BRYOCORINEN

Von B. Poppius
(*Helsingfors, Finland*)

Helopeltis bakeri sp. nov.

♂ : Glänzend schwarz, eine Längsbinde in der Mitte des Schildchens und die Basis der Spina auf demselben, der Seitenrand des Hinterkörpers schmal, die Hüften und die Basis der Schenkel hellgelb, der Kopf vorne und jederseits unterhalb der Augen, das Rostrum, die dunkle Spitze ausgenommen, und der Hinterkörper unten an der Basis und in der Mitte gelb, das 1. Fühlerglied gelbbraun, oben und zur Spitze dunkelbraun, die innerste Basis schwarzbraun, die Beine sonst dunkelbraun, undeutlich dunkel gefleckt, die Schienen braun, zur Spitze etwas heller, die Hinterschenkel schwarz, die Hemielytren durchsichtig grau, die Venen und der Cuneus schwarz.

♀ : Rotgelb, auf dem Kopfe die Augen, die Einlenkungsstelle der Fühler und ein Fleck auf der Stirn zwischen den Augen, die Seiten der Hinterbrust, der Hinterkörper vor der Spitze unten und die Fühler schwarz, das 1. Glied braun, zur Basis heller, zuweilen gelbbraun, die innerste Basis schwarz, die vorderen Beine rotgelb, schwarz gefleckt, die Hinterschenkel schwarzbraun, die Hinterschienen braungelb, an der Basis und an der Spitze dunkler, die Füsse und die Spitze des Rostrums schwarzbraun, die Spina des Schildchens mit braungelber Spitze, die Hemielytren wie beim ♂, nur die Basis ist rotgelb.

Die Stirn ist beim ♂ und beim ♀ etwas mehr wie dreimal so breit als der Durchmesser des Auges. Das Rostrum erstreckt sich bis zur Spitze der Mittelhüften. Das 1. Fühlerglied 3 mm., das zweite 4.2 mm. das dritte 3.5 mm. Der Halsschild an der Basis fast dreimal so breit als an der Spitze, die Seiten des Basallobus fast gerade. Die Spina des Schildchens kaum gebogen, etwas nach hinten geneigt, etwa ebenso lang als der Halsschild.

Long. ♂, 5.5; ♀, 7.5 mm.

Luzon, Laguna, Los Baños (3 Exemplare, Museum Helsingfors).

Von den beiden früher von den Philippinen bekannten Arten der Gattung *H. pellucidus* Stål und *H. collaris* Stål, durch andere

Farbe verschieden. Ist sonst nahe mit *H. bradyi* Wat. aus Java verwandt, unterscheidet sich aber u. a. durch andere Farbe.

Das ♂ ist in Copula mit einem der ♀ gefunden worden, woher die Zusammengehörigkeit der beiden Geschlechter zweifellos ist.

Helopeltis obscuratus sp. nov.

♀ : Der Kopf ist gelbrot, die Einlenkungsstelle der Fühler und die Stirn zum grössten Teil hinter den letztgenannten braunschwarz, die Augen schwarz, der Halsschild einfarbig dunkelbraun, das Schildchen braungelb mit dunkelbrauner Spina, die Hemielytren graugelb, durchsichtig, die Basis gelbrot, die Venen und der Cuneus schwarzbraun, die Membran rauchig schwarzbraun mit schwarzen Venen, die Unterseite schmutziggelbbraun, der Hinterkörper schwarzbraun mit brauner Spitze und schmal gelben Seiten, das Rostrum gelb, die äusserste Spitze dunkel, die Fühler einfarbig schwarz, die Schenkel und die Basis der Schienen schwarz, die Hüften und die Basis der Schenkel gelblich, die Schienen und die Füsse gelbbraun, die erstgenannten einzeln dunkel gefleckt, die Spitze der Füsse dunkel.

Die Stirn ist beim ♀ etwa dreimal so breit als der Durchmesser des Auges. Das Rostrum erstreckt sich bis zur Spitze der Mittelhüften. Das 1. Fühlerglied 3, das zweite 5, das dritte 4 mm. Der Basalrand des Halsschildes ist etwa dreimal so breit als der Vorderrand. Die Seiten des Basallobus leicht gerundet. Die Spina des Schildchens deutlich kürzer als der Halsschild, fast gerade, nur wenig nach hinten geneigt.

♂ unbekannt.

Long., 8 mm.

LUZON, Laguna, Los Baños (1 Exemplar, Museum Helsingfors; *C. F. Baker*).

Ist nahe mit der vorigen Art verwandt, unterscheidet sich aber durch andere Farbe und längere Fühler.

Helopeltis pollidiceps sp. nov.

♂ : Gelb, der Halsschild schwarzbraun, die Seiten des Basallobus vom Vorderrande fast bis zu den Hinterecken, nach vorne zu breiter, gelb, die Hemielytren fast glasartig durchsichtig mit dunklen Venen, der Cuneus gelb mit dunklem Innenrande, die Membran rauchgrau mit dunklen Venen, die Spitze des Rostrums, das 2. und das 3. Fühlerglied, die Augen und die Spitze der Füsse schwarzbraun, das 2. Fühlerglied nach der Basis zu gelbbraun, die Unterseite des Hinterkörpers ausgedehnt braunschwarz.

Die Augen sind ziemlich gross, hervorspringend, die Stirn beim ♂ etwa viermal so breit als der Durchmesser des Auges. Das Rostrum erstreckt sich bis zur Spitze der Mittelhüften, das 1. Glied fast den Hinterrand des Auges erreichend. Das 1. Fühlerglied mit etwas verdickter Spitze, 2 mm. lang, das zweite 4.5 mm. (das 3. zum Teil und das letzte mutiliert). Der Halsschild ist etwa ebenso lang als an der Basis breit, der letztgenannte etwa doppelt so breit als der Vorderrand, die Seiten des Basallobus leicht gerundet. Die Scheibe ist ziemlich gewölbt und geneigt, glatt. Die Spina des Schildchens kaum länger als der Halsschild, ganz leicht nach hinten gebogen, die Spitze verdunkelt.

♀ unbekannt.

Long., 5.5; lat., 1 mm.

LUZON, Laguna, Mt. Maquiling (1 Exemplar, Museum Helsingfors; *C. F. Baker*).

Durch die eigenartige Farbenzeichnung leicht erkenntlich.

Genus **MANSONIELLA** novum

Der Körper ziemlich gestreckt, oben stark glänzend unpunktiert, der Vorderkörper unbehaart, die Hemielytren kurz und anliegend hell behaart. Der Kopf ist vertical, von oben gesehen deutlich breiter als lang, von vorne gesehen kurz vorgezogen, viel breiter als lang, von der Seite gesehen etwa ebenso lang als an der Basis hoch. Die Stirn ist ziemlich stark gewölbt, an der Basis ungerandet, in der Mitte ohne Längsfurche, hinter den Augen stark halsförmig verengt. Die Augen sind ziemlich gross und hervorspringend, glatt, ziemlich weit vom Vorderrande des Halsschildes entfernt. Der Clypeus ist ziemlich hervortretend, von der Stirn deutlich abgesetzt, die Lorae sind undeutlich, die Wangen klein, die Kehle mässig lang, fast horizontal, der Gesichtswinkel ein rechter. Das Rostrum ist kurz und ziemlich dünn, die Basis der Vorderhüften nur wenig überragend, das 1. Glied nicht über den Hinterrand der Augen sich erstreckend. Die Fühler sind ziemlich lang, das 1. Glied ziemlich kurz, zur Spitze etwas verdickt, mit einzelnen, halb abstehenden, kürzeren Haaren, die folgenden Glieder untereinander gleich dick, etwas dünner als das 1. an der Basis, mässig lang, halb abstehend, behaart, das letzte ausserdem mit einzelnen längeren und mehr abstehenden Haaren besetzt, das 2. viel länger als das 1., etwas länger als das 3., das letzte kaum kürzer als das 1. Der Halsschild ist etwas länger als breit, nach vorne stark verengt, der Basalrand in der Mitte ganz leicht

ausgeschweift. Die Scheibe am Hinterrande der Calli tief quer eingedrückt und eingeschnürt, der Basallobus wenig stark gewölbt, leicht geneigt, die Seiten desselben in der Mitte ausgeschweift, vorne abgerundet. Die Calli sind gross, ganz zusammenfliessend, bis zum Seitenrande des Halsschildes sich erstreckend, die Apicalstrictur ist breit, flach gewölbt, etwa um die Hälfte schmäler als die Calli. Das Schildchen ist flach mit bedeckter Basis. Die Hemielytren beim ♀ mässig die Hinterkörperspitze überragend, hinter der Mitte etwas erweitert, das Embolium des Coriums schmal, der Cuneus etwas länger als an der Basis breit. Die Membran fein der Länge nach gestreift, einzellig, die Zelle ziemlich schmal und gestreckt mit rechtwinkeliger, apicaler Innenecke. Die Hinterflügelzelle ohne Hamus. Die Orificien des Metastethiums sind undeutlich. Die Beine sind kurz, wenig verdickt, lang und halb abstehend behaart, die Schienen unbedornt, das letzte Fussglied zur Spitze erweitert. Die Arolien der Klauen sind gross, mit den letztgenannten verwachsen, nur die Spitze ist frei.

Ist nahe mit *Pachypeltis* Sign. und *Eupachypeltis* Popp. verwandt. Von der letztgenannten Gattung durch den unbehaarten Vorderkörper, durch das an der Basis bedeckte Schildchen, durch die oben glatten Hemielytren und durch die kurzen Beine zu unterscheiden. Von *Pachypeltis* durch den gedrungeneren Körper, durch den Bau des Halsschildes und der Membranzelle, durch den breiteren Cuneus und durch die kürzeren Beine verschieden.

Typus: *M. nitida* sp. nov.

Mansoniella nitida sp. nov.

Rot, der Halsschild in der Mitte gelbrot, das Corium, die Basis und etwa das apicale Drittel ausgenommen, der Cuneus, die Spitze ausgenommen, die Unterseite, die Basis des ersten Fühlergliedes und die Beine gelb, die Schenkel zur Spitze und die Schienen rot überzogen, die Membran gelb mit roten Venen, die Mittelbrust braun.

Die Stirn etwa dreimal so breit als der Durchmesser des Auges. Das 1. Fühlerglied etwas länger als die Apicalstrictur und die Calli des Halsschildes zusammen, das 2. etwa dreimal so lang als das 1. Der Basalrand des Halsschildes etwa viermal so breit als der Vorderrand.

Long., 7; lat., 2.6 mm.

Tonkin, Mt. Manson, 2,000–3,000 Fuss, April–Mai (Museum Vindob; *H. Fruhstorfer*).

Genus **EUPACHYPELTIS** novum

Der Körper gestreckt, oben glänzend lang und abstehend behaart. Der Kopf ist vertical, von oben gesehen breiter als lang, hinter den Augen ziemlich lang halsförmig verengt, von vorne gesehen breit vorgezogen und viel breiter als lang, von der Seite gesehen etwas länger als an der Basis hoch. Die Stirn ist ungerandet, an der Basis kurz und breit, flach eingedrückt, von der Seite gesehen ziemlich gewölbt, vorne vertical. Die Augen sind ziemlich gross, stark hervorspringend, glatt, vom Vorderrande des Halsschildes weit entfernt. Der Clypeus ist ziemlich hervortretend, vertical, von der Stirn deutlich abgesetzt, die Lorae undeutlich, die Wangen sind klein, die Kehle lang, horizontal, der Gesichtswinkel ein rechter. Das Rostrum ist ziemlich dick, kurz, die Spitze der Vorderhüften nur wenig überragend, das 1. und das 3. Glied zur Spitze verdickt. Die Fühler sind etwas oberhalb der Spitze des Augenvorderrandes eingelenkt, das 1. Glied ziemlich lang und dick, in der Mitte am dicksten, das 2. viel dünner nur länger als das 1., beide mit kürzeren und längeren, abstehenden Haaren bekleidet (die 2 letzten Glieder mutiliert). Der Halsschild ist etwa ebenso lang als am Basalrande breit, nach vorne kräftig verengt, der Basalrand in der Mitte fast gerade. Die Scheibe ist mässig gewölbt und geneigt, unpunktiert und ungerunzelt, jederseits innerhalb der Hinterecken mit einem Längseindrucke, am Hinterrande der Calli scharf eingeschnürt. Die Seiten bis zur Einschnürung leicht ausgeschweift, am Vorderrande der Calli eingeschnürt. Die Calli sind gross, bis zu den Seiten des Halsschildes sich erstreckend, zusammenfliessend, ziemlich gewölbt, die Apicalstrictur ist breit, nur wenig schmäler als die Calli. Das Schildchen flach, undeutlich quer gerunzelt, an der Basis etwas unbedeckt. Die Hemielytren beim ♀ ziemlich die Hinterkörperspitze überragend, vor der Mitte ganz leicht ausgeschweift, ziemlich stark, etwas raspelartig, regelmässig gerunzelt, das Embolium ist ziemlich breit mit aufgebogenem Aussenrande. Der Cuneus ist wenig lang. Die Membranzelle ziemlich lang mit fast rechtwinkeliger apicaler Innenecke. Die Hinterflügelzelle ohne Hamus. Die Orificien des Metastethiums sind klein mit undeutlicher Öffnung. Die Beine mässiglang, lang und abstehend behaart, die Schienen ohne Dörnchen, das letzte Fussglied zur Spitze erweitert. Die Arolien der Klauen sind gross und breit, mit den letztgenannten verwachsen, zur Spitze frei werdend.

Die Gattung ist nahe mit *Pachypeltis* Sign. verwandt, der Körper aber ist mehr gedrungen, die Oberseite und die Fühler sind lang und abstehend behaart, der Halsschild ist in der Mitte des Basalrandes nicht merkbar ausgeschweift, die Hemielytren sind raspelartig und ziemlich stark gerunzelt, der Cuneus ist kürzer und breiter und die Membranzelle ist etwas anders geformt.

Typus: *E. pilosus* sp. nov.

Eupachypeltis pilosus sp. nov.

♀ : Schmutzigbraungelb, ein schwarzer Fleck jederseits an der Basis des Schildchens, das Corium zur Spitze braun, der Cuneus gelblich, die Membran gelbbraun mit etwas dunkleren Venen, die Fühler und die Vorderbeine braun, die Spitze des zweiten Fühlergliedes und der Vorderschienen sowie das Rostrum braunschwarz, die hinteren Beine gelblich mit schwach rötlichem Anfluge.

Die Stirn beim ♀ etwa $2\frac{1}{2}$ mal so breit als der Durchmesser des Auges. Das 1. Fühlerglied kaum länger als der Kopf und die Apicalstrictur des Halsschildes zusammen, das 2. etwa dreimal so lang als das 1. Der Basalrand des Halsschildes mehr wie dreimal so breit als der Vorderrand.

♂ unbekannt.

Long., 7; lat., 2.2 mm.

Pulo Laut (1 Exemplar, Museum Helsingfors; *Gribodo*).

Felisacus pulchellus sp. nov.

♀ : Oben glänzend, einzeln und abstehend hell behaart. Der Kopf, der Vorderteil des Halsschildes bis zum Hinterrande der Calli und die Vorderbrust, die Pleuren ausgenommen, rot, die Stirn vorne gelbrot, die Kopfspitze, der Basallobus des Halsschildes, der Clavus, eine leicht nach hinten gebogene Querbinde gleich vor der Mitte und eine andere am Apicalrande, die ganze Commissur, die Clavalsutur und der äusserste Aussenrand des Emboliums zwischen den Querbinden, die Membran bis zur Mitte, die Propleuren, die hinteren Brüste und die Spitze des Hinterkörpers schwarz, die Spitze des Cuneus schwarzbraun, das Corium und der Cuneus sonst durchsichtig weissgelb, die Apicalhälfte der Membran glasartig durchsichtig, irisierend, der Hinterkörper unten gelbweiss, das Rostrum gelb mit dunkler Basis, die Fühler schwarzbraun, fast die ganze Basalhälfte des zweiten Gliedes gelbbraun, die Orificien des Metastethiums und die Beine hellgelb, das apicale Drittel der Vorderschenkel, die Spitze und ein Ring vor derselben auf den hinteren Schenkel

sowie etwas mehr als das basale Drittel der Schienen schwarzbraun.

Die Kopfspitze ist von der Seite gesehen kurz rüsselartig vorgezogen. Die Stirn ist beim ♀ mehr wie doppelt breiter als der Durchmesser des Auges. Das dünne Rostrum erstreckt sich bis zu den Mittelhüften, das 1. Glied die Kopfbasis nicht erreichend. Das 1. Fühlerglied ist etwa ebenso lang als der Kopf bis zum Vorderrande der Augen und die Apicalstrictur des Halsschildes zusammen, das 2. etwas länger als das 1., deutlich kürzer als das 3., das letzte etwas kürzer als das 1. Der Basallobus des Halsschildes ziemlich stark gewölbt, unpunktiert, die Seiten desselben leicht gerundet. Das Schildchen ist etwas gewölbt. Die Hemielytren beim ♀ ziemlich weit die Hinterkörperspitze überragend, die dunklen Zeichnungen derselben sind matt.

♂ unbekannt.

Long., 4; lat., 1 mm.

LUZON, Laguna, Los Baños (1 Exemplar, Museum Helsingfors; *C. F. Baker*).

Ist am nächsten mit *F. magnificus* Dist. verwandt, unterscheidet sich aber durch andere Farbe, durch etwas anderen Bau der Fühler und durch den glatten Basallobus des Halsschildes.

Felisacus glabratus (Motsch.), früher von Ceylon und Java bekannt, kommt auch auf den Philippinen vor. Mir liegt ein Stück aus Los Baños, von Prof. Baker gesammelt, vor.

Genus **VOLKELIOPSIS** novum

Der Körper ziemlich gedrungen, an den Seiten wenig gerundet, oben glänzend, abstehend, kurz, schwarz behaart, auf dem Kopfe ist die Behaarung weitläufiger und etwas länger. Der Kopf ist vertical, von oben gesehen viel breiter als lang, von vorne gesehen breit und kurz vorgezogen, viel breiter als lang, von der Seite gesehen etwa ebenso lang als an der Basis hoch. Die Stirn ist vorn stark gewölbt, an der Basis ungerandet, mit einer ziemlich breiten Längsfurche, vorne gleich oberhalb der Clypeusbasis mit 2 nahe zu einander stehenden Höckerchen. Die Augen sind glatt, mässig gross, von oben gesehen rundlich, sehr stark hervorspringend, wie gestielt, von vorne gesehen gerade nach den Seiten zu gerichtet, vom Vorderrande des Halsschildes entfernt, der Kopf hinter denselben sehr stark verengt. Der Clypeus ist ziemlich hervortretend, von der Stirn deutlich abgesetzt, nach der Spitze zu etwas nach hinten gerichtet, in der Mitte breit stumpfwinkelig ausgeschnitten. Die Wangen sind mässig hoch, die Kehle wenig lang, horizontal, der Gesichts-

winkel ist ein rechter. Das Rostrum ist ziemlich dick, gerade, bis zur Basis der Mittelhüften sich erstreckend, das 1. Glied wenig verdickt, die Kopfbasis nicht erreichend. Die Fühler sind sehr kräftig, vor den Augen eingelenkt, dicht, ziemlich kurz, halb abstehend behaart, die Einlenkungsstelle kurz gestielt. Das 1. Glied ist kurz, dick, nur etwa $\frac{1}{3}$ länger als breit, die Basis unten breit vorgezogen, das 2. viel länger als das 1., wie das 3. mit flachen Unebenheiten, nach der Spitze allmählich, ziemlich schwach verdickt und hier nur unbedeutend dünner als das 1., das 3. kürzer als das 2., nach der Spitze zu mässig verdickt und hier ebenso dick als das 1. (das letzte Glied mutiliert). Der Halsschild ist breiter als lang, nach vorne stark verengt, die Seiten ungerandet, fast gerade, der Basalrand in der Mitte breit ausgeschweift, die Hinterecken nicht vorgezogen, gerundet. Die Scheibe ist ziemlich gewölbt, stark geneigt, sehr stark, dicht punktiert, jederseits innerhalb der Hinterecken abgeflacht. Die Calli sind deutlich abgesetzt, klein, flach, ziemlich weit von einander getrennt, die Apicalstrictur ist breit. Das Schildchen ist an der Basis quer eingedrückt, flach gewölbt, wie der Halsschild punktiert mit ziemlich breit abgerundeter Spitze, in der Mitte mit einer flachen, wenig hervortretenden Längslinie. Die Hemielytren beim ♂ ziemlich die Hinterkörperspitze überragend, die Seiten derselben fast gerade, der Clavus und das Corium äusserst fein gerunzelt, der Cuneus etwas länger als breit. Die einzige Zelle der Membran ziemlich gestreckt mit spitzer apicaler Innenecke. Die Hinterflügelzelle ohne Hamus. Die Propleuren dicht und stark punktiert. Das Metastethium ohne deutliche Orificien. Die hinteren Hinterkörpersegmente mit spitz vorgezogenen Aussenecken, das Convexivum von oben gesehen unbedeutend ausserhalb der Hemielytren sich erstreckend. Die Beine ziemlich kurz, kurz und halb abstehend behaart, die Schienen fein bedornt. Das 1. Glied der Hinterfüsse etwa ebenso lang als das 2., das letzte nach der Spitze zu kaum verdickt, die Arolien der Klauen sind ziemlich breit, an der Basis mit denselben verwachsen, sonst denselben stark genähert.

Diese Gattung ist nahe mit *Volkelius* Dist. verwandt. Der Kopf ist anders gebaut, der Bau der Fühler und des Schildchens ist abweichend.

Typus: *V. frontalis* sp. nov.

Volkeliopsis frontalis sp nov.

♂ : Rotgelb, die Stirn oberhalb des Clypeus mit einem braunen Flecke, die Hemielytren, die innerste Basis ausgenommen, die Seiten des Hinterkörpers vom dritten Segmente an, die äus-

serste Spitze des Rostrums und die Fühler, die innerste Basis des ersten Gliedes ausgenommen, schwarz, die Membran rauchschwarz.

Die Stirn ist beim ♂ etwa viermal so breit als der Durchmesser des Auges. Das 1. Fühlerglied ist etwa ebenso lang als der Kopf von der Seite gesehen vom Vorderrande der Augen bis zur Clypeusspitze, das 2. etwa sechsmal so lang als das 1., das 3. etwa um die Hälfte kürzer als das 2. Der Halsschild ist etwa um $\frac{1}{4}$ kürzer als am Basalrande breit, der letztgenannte etwa dreimal so breit als der Vorderrand.

♀ unbekannt.

Long., 7; lat., 3 mm.

LUZON, Laguna, Mt. Maquiling (1 Exemplar, Museum Helsingfors; *C. F. Baker*).

Prodromopsis philippinensis sp. nov.

♀ : Oben glänzend, kurz und halb abstehend weiss behaart. Grün, der Kopf, das Schildchen an der Basis, die Unterseite zum grössten Teil und die Füsse gelb, die Spitze der letztgenannten und die Fühler schwarzbraun, die innerste Basis des ersten Fühlergliedes hell, die Membran glasartig durchsichtig, irisierend, die Venen grün.

Der Kopf ist vertical, ein wenig nach hinten geneigt, von oben gesehen breiter als lang, von vorne gesehen lang vorgezogen, spitz dreieckig. Die Augen sind ziemlich gross, stark hervorspringend und von vorne gesehen nach oben gerichtet. Die Stirn leicht konkav, von oben gesehen vorne zwischen den Fühlern etwas ausgeschweift, beim ♀ etwa $2\frac{1}{2}$ mal so breit als der Durchmesser des Auges. Das gelbe, an der Spitze verdunkelte Rostrum erstreckt sich bis zur Mitte der Mittelbrust, das 1. Glied kaum die Kopfbasis überragend. Das 1. Fühlerglied ist etwa ebenso lang als der Apicalrand des Halsschildes breit, das 2. etwa doppelt so lang als das 1., das 3. kaum kürzer als das 2., etwa $\frac{1}{3}$ kürzer als das letzte. Der Halsschild ist länger als breit, der Basalrand ziemlich tief ausgeschweift, etwa doppelt breiter als der Vorderrand, die Seiten etwas ausgeschweift. Die Scheibe mässig gewölbt, kaum geneigt, dick und mässig stark punktiert, die Calli deutlich abgesetzt, flach gewölbt. Das Schildchen ist unpunktiert. Die Hemielytren beim ♀ ziemlich die Hinterkörperspitze überragend, undeutlich runzelig punktuliert, die Punktur auf dem Clavus etwas mehr hervortretend. Der Cuneus ist lang, bis zum letzten Fünftel der Membran sich erstreckend, etwas breiter und zur Spitze mehr allmählich verengt als bei den anderen Arten der Gattung.

♂ unbekannt.

Long., 4.5; lat., 1.5 mm.

LUZON, Laguna, Los Baños (1 Exemplar, Museum Helsingfors; *C. F. Baker*).

Am nächsten mit *Pr. cuneatus* (Dist.) verwandt, von dieser sowie auch von *Pr. oculatus* Popp. durch den breiteren Cuneus zu unterscheiden. Von der erst genannten Art ausserdem durch von vorne gesehen schmäleren Kopf mit mehr nach oben gerichteten Augen, durch die einfarbig schwarzen Fühler, deren drittes Glied kürzer ist, sowie durch schmäleren, in der Mitte mehr ausgeschweiften Halsschild verschieden. Von *Pr. oculatus* ausserdem durch anderen Bau des Kopfes abweichend.

Hekista laudator Kirk.

Hekista laudator Kirk., Trans. Ent. Soc. London (1902), 248.
Combalus laudator DIST., Fauna Brit. Ind. Rhynch. (1904), 2, 431.

Die Gattung *Combalus* ist mit *Hekista* synonym. *C. novitius*, die einzige Art der Distant'schen Gattung, ist jedoch nicht mit *H. laudator* Kirk. identisch. Die beiden Arten unterscheiden sich leicht von einander u. a. durch andere Farbe, indem bei *laudator* der Basalrand des Halsschildes, die Clavalsutur und der Basalteil der Commissur auf dem Clavus sowie der Cuneus, der Innenrand ausgenommen, gelb sind. Eine ausführlichere Beschreibung der Gattung ist in Tijdskr. voor Ent. (1914) publiciert.

Taivoniella cuneale sp. nov.

♂, ♀: Gestreckt, oben matt, anliegend und kurz, weiss behaart, nur der Kopf glänzend. Schwarz, der Cuneus, der scharf begrenzte, schwarze Aussenrand ausgenommen, gelbweiss, die Membran rauchig gelbgrau, nach der Basis zu dunkler, die Beine und das Rostrum hellgelb, die Schienen mehr oder weniger, beim ♀ deutlicher schwarzbraun, die Spitze der Füsse und die 2 ersten Fühlerglieder (die 2 letzten mutiliert), schwarz, das 1. Glied beim ♂ gelbbraun mit schwarzer Spitze.

Der Kopf ist wie bei *F. fulvigenis* Popp. gebaut, die Stirn ist etwa doppelt (♂)—2½ mal (♀)—so breit als der Durchmesser des Auges. Das Rostrum erstreckt sich bis zur Basis der Hinterhüften, das 1. Glied etwa die Mitte der Vorderhüften erreichend. Das 1. Fühlerglied ist etwa ebenso lang als der Vorderlobus und die Apicalstrictur des Halsschildes zusammen, das 2. fast dreimal so lang als das 1. Der Halsschild ist wie bei *fulvigenis* gebaut, nur der Basallobus ist nach vorne weniger stark verengt und die Apicalstrictur ist etwas schmäler. Die

Hemielytren ziemlich weit die Hinterkörperspitze überragend, die Membranzelle gestreckt mit zugespitzter, apicaler Innenecke.

Long., 3.8; lat., 1 mm.

LUZON, Laguna, Los Baños (2 Exemplare, Museum Helsingfors; *C. F. Baker*).

Von *T. fulvigenis* Popp. durch die Farbe des Kopfes und des Cuneus sowie durch das auffallend längere zweite Fühlerglied zu unterscheiden.

Genus **EOFURIUS** novum

Der Körper ist klein, ziemlich gestreckt, oben mässig glänzend, punktiert, halb abstehend, ziemlich kurz weiss behaart. Der Kopf vertical, leicht nach hinten gerichtet, von oben gesehen viel breiter als lang, von vorne gesehen ziemlich breit vorgezogen, etwas breiter als lang, von der Seite gesehen etwas kürzer als an der Basis hoch. Die Stirn ist ungerandet und ungefurcht, unpunktiert, glänzend, mässig gewölbt. Die Augen sind ziemlich klein, hervorspringend, fein granuliert, den Vorderrand des Halsschildes berührend. Der Clypeus ist wenig stark hervortretend, von der Stirn deutlich abgesetzt, die Lorae undeutlich, die Wangen ziemlich klein, die Kehle kurz, fast vertical, der Gesichtswinkel leicht zugespitzt. Das Rostrum ist mässig dick und erstreckt sich bis zur Spitze der Mittelhüften, das 1. Glied etwa die Mitte der Vorderhüften erreichend. Die Fühler sind dünn, kurz und etwas abstehend behaart, etwas vor den Augen eingelenkt, das 1. Glied ist kurz, zur Spitze nicht verdickt, das 2. viel länger als des 1., zur Spitze kaum verdickt (die 2 letzten Glieder mutiliert). Der Halsschild ist etwas kürzer als breit, nach vorne ziemlich verengt, der Basalrand gerade, die Seiten nach vorne ausgeschweift, ungerandet. Die Scheibe ist ziemlich gewölbt und geneigt, am Hinterrande der Colli bis zu den Seiten quer eingedrückt, dicht und ziemlich stark punktiert. Die Colli sind mässig gross, bis zu den Seiten des Halsschildes sich erstreckend, in der Mitte von einander getrennt, glatt. Die Apicalstrictur ist scharf abgesetzt, breit, etwas schmäler als die Colli, dicht und fein punktiert. Das Schildchen ist flach und matt, kurz, unpunktiert und ungerunzelt, mit bedeckter Basis, hinter der letztgenannten quer eingedrückt. Die Hemielytren fast matt, undurchsichtig, beim ♂ weit die Hinterkörperspitze überragend, fast parallelseitig, der Clavus und das Corium fein quer gerunzelt, die Commissur des letzt genannten ganz kurz, der Cuneus lang und schmal, die Membran einzellig, die Zelle ziemlich lang und schmal mit abgerundeter apicaler Innenecke. Die Hinterflügelzelle ohne Hamus. Die Orificien des Metastethi-

ums sind undeutlich. Die Beine sind ziemlich lang, nicht verdickt, halb abstehend behaart, die Schienen sind unbedornt, das letzte Fussglied zur Spitze verdickt. Die Arolien der Klauen sind gross und breit und mit denselben verwachsen.

Ist nahe mit *Palaeofurius* Popp. verwandt, unterscheidet sich aber durch weniger hervortretenden Clypeus, durch die Augen, die den Vorderrand des Halsschildes berühren, durch den geraden Basalrand des Halsschildes und durch die undurchsichtigen, quer gerunzelten, fast matten Hemielytren.

Typus: *E. pygmaeus* sp. nov.

Eofurius pygmaeus sp. nov.

♂: Weissgelb, die Augen schwarz, der Basalrand des Kopfes ganz schmal, der Basalrand des Halsschildes in der Mitte, das Schildchen, der Clavus, die Apicalhälfte des Coriums, der Aussenrand und die äussere Apicalecke ausgenommen, die Vorderbrust jederseits, in der Mitte, die hinteren Brüste und der Hinterkörper, die Spitze ausgenommen, braunschwarz, das 1. Fühlerglied gelb, zur Spitze braun, das 2. schwarzbraun.

Die Stirn beim ♂ etwa dreimal so breit als der Durchmesser des Auges. Das 1. Fühlerglied etwa ebenso lang als der Kopf von der Seite gesehen, das 2. fast 2½ mal so lang als das 1. Der Basalrand des Halsschildes etwa doppelt so breit als der Vorderrand. Das Genitalsegment beim ♂ links mit einer langen, unten an der Spitze vorgezogenen Spina.

♀ unbekannt.

Long., 2.5; lat., 0.9 mm.

LUZON, Laguna, Los Baños (1 Exemplar, Museum Helsingfors; *C. F. Baker*).

Pycnofurius amorphophalli sp. nov.

♂, ♀: Oben glänzend, auf dem Vorderkörper abstehend, auf den Hemielytren halb abstehend, kurz hell behaart. Schwarz, die Hemielytren, das Rostrum, das 1. Glied und die Spitze ausgenommen, die Fühler und die Beine gelbweiss, der Clavus, ein breiter Querfleck hinter der Mitte auf dem Corium, nach aussen bis zum Embolium sich erstreckend, die Membran bis etwas über die Mitte und das 2. Fühlerglied schwarz, die dunkle Zeichnung auf den Hemielytren ein Kreuz bildend.

Der verticale Kopf ist viel breiter als lang. Die Stirn von der Seite gesehen gewölbt, sowohl beim ♂ wie beim ♀ mehr wie dreimal so breit als der Durchmesser des Auges. Die Augen sind mässig gross und hervorspringend, ganz fein granuliert. Das Rostrum erstreckt sich bis zur Spitze der Mittelhüften, das 1. Glied etwas die Basis der Vorderhüften über-

ragend. Das 1. Fühlerglied ist etwa um ein Drittel kürzer als die Breite der Stirn zwischen den Augen, das 2. zur Spitze leicht verdickt, etwas mehr wie doppelt so lang als das 1., die 2 letzten dünn, das 3. länger als das letzte, das etwa ebenso lang als das 1. ist. Der Halsschild ist kaum länger als am Basalrande breit, der letztgenannte in der Mitte leicht ausgeschweift, etwa doppelt so breit als der Vorderrand. Die Seiten sind bis zur Einschnürung ziemlich gerundet, dann bis zum Vorderrande gerade. Die Scheibe sehr kräftig gewölbt und geneigt, am Hinterrande der Calli tief quer eingedrückt, vor den Calli mässig aufgetrieben, dicht und ziemlich stark punktiert, die Punktur auf dem Vorderteil etwas feiner. Das flache Schildchen ist unpunktiert. Die Hemielytren sowohl beim ♂ wie beim ♀ weit die Hinterkörperspitze überragend, undeutlich, auf dem Clavus etwas dichter gerunzelt, die schwarzen Zeichnungen matt. Die Membranzelle mit rechtwinkeliger, apicaler Innenecke.

Long., 3.5; lat., 1.5 mm.

LUZON, Laguna, Los Baños, an *Amorphophallus campanulatus* lebend (2 Exemplare, Museum Helsingfors; *C. F. Baker*).

Von der einzigen, früher bekannten Art der Gattung, *P. puncticollis* Popp., durch andere Farbe, durch kürzere und dikkere Fühler sowie durch die nicht abgerundete, innere Apicalecke der Membranzelle zu unterscheiden.

Genus **SIPORIA** novum

Der Körper gedrungen, oben glänzend, ziemlich kurz, abstehend, gelb behaart, punktiert. Der Kopf ist klein, mässig stark geneigt, von oben gesehen kürzer als breit, von vorne gesehen etwas spitz vorgezogen, etwas breiter als lang, von der Seite gesehen etwas länger als an der Basis hoch. Die Stirn ist mässig gewölbt, fein gerandet, in der Mitte mit einer feinen Längsfurche, der Clypeus ist kräftig hervortretend, von den Seiten etwas zusammengedrückt, von der Stirn wenig scharf abgesetzt, die Lorae sind schmal, die Wangen sind ziemlich klein, die Kehle mässig lang, geneigt, der Gesichtswinkel ein rechter. Die Augen sind fast glatt, gross und stark hervorspringend, den Vorderrand des Halsschildes fast berührend, vorne nicht ausgeschweift. Das Rostrum ist kurz, die Spitze der Vorderhüften kaum erreichend, das 1. Glied die Augenmitte nicht überragend. Die Fühler sind gleich unterhalb der Mitte des Augenvorderrandes eingelenkt, kurz, das 1. Glied wenig verdickt, nach der Spitze zu etwas dicker werdend, einzeln, halb abstehend behaart, die Kopfspitze etwas überragend, das 2. länger als das 1., dichter behaart, nach der Spitze zu ziemlich verdickt und hier dicker

als das 1., die 2 letzten dünn, zusammen etwas kürzer als das 2. und unter einander etwa gleich lang. Der Halsschild ist ziemlich stark gewölbt, mässig geneigt, kräftig punktiert, viel breiter als lang, nach vorne stark verengt mit leicht gerundeten Seiten. Der Basalrand ist breit gerundet, die Calli sind klein, flach, von einander getrennt, die Apicalstrictur ist scharf abgesetzt, ziemlich schmal. Das Schildchen ist klein, flach, glatt, mit bedeckter Basis. Die Hemielytren beim ♀ nur unbedeutend die Hinterkörperspitze überragend, fein runzelig punktiert, das Corium mit 2 Längsfurchen, von denen die innere kürzer ist, der Cuneus ist schmal, länger als breit, durch eine ziemlich tiefe Fractur vom Corium abgesetzt. Die Membran mit einer Zelle, die mässig gestreckt ist mit fast rechtwinkeliger apicaler Innenecke. Die Hinterflügelzelle ist ohne Hamus. Die Orificien des Metastethiums sind klein mit feiner, ungekanteter Spalte. Die Beine sind kurz, kurz und halbabstehend behaart, die Schienen unbedornt, die Hinterschienen ganz leicht gebogen, das letzte Fussglied nach der Spitze zu etwas erweitert, das 1. Glied der Hinterfüsse kurz. Die Klauen kurz mit breiten, mit denselben verwachsenen Arolien.

Typus: *S. flaviceps* sp. nov.

Siporia flaviceps sp. nov.

♀: Schwarz, der Halsschild etwas metallisch schimmernd, der Kopf, auf dem Halsschilde die Apicalstrictur und die Hinterecken ganz schmal, die Vorderbrust, das Rostrum, die Fühler und die Beine gelb, die Kopfspitze, auf den Hinterschenkeln ein Ring vor der Spitze und ein Fleck oben an derselben braun, das 2. Fühlerglied und die hinteren Hüften schwarzbraun, etwas mehr als das basale Drittel des erstgenannten gelb, die Membran rauchig braunschwarz mit etwas dunkleren Venen, die Spitze breit gelblich.

Die Stirn beim ♀ fast doppelt so breit als der Durchmesser des Auges. Das 1. Fühlerglied kaum länger als die Stirn zwischen den Augen breit (♀), das 2. etwa doppelt so lang als das 1. Der Halsschild ist nicht voll um die Hälfte kürzer als am Basalrande breit, der letztgenannte mehr wie dreimal so breit als der Vorderrand.

♂ unbekannt.

Long., 4; lat., 2 mm.

MENTAWEI, Sipora, Sereinu, Mai–Juni, 1894 (1 Exemplar, Musum Genova; *E. Modigliani*).

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NEW SPECIES OF PHILIPPINE LIZARDS

By EDWARD H. TAYLOR
(*Hinigaran, Occidental Negros, Negros, P. I.*)

ONE PLATE

This paper is based on the collections made by the Bureau of Science during the past ten years and that made by me during the last two years. The latter collection is by far the larger and more representative. It has been made chiefly in Baguio, Mountain Province; Occidental Negros Province; and Agusan Province, Mindanao.

Most of the new species were taken at Bunauan, in the upper Agusan Valley. So far as I know, no collection has ever been made before in this locality. Hugh Cuming and A. H. Everett collected at various places along the coast of Mindanao during Spanish times; in more recent years Dr. Edgar A. Mearns and Maj. J. M. T. Partello of the United States Army collected in various parts of the interior. New species taken by the two American collectors were sent to the Smithsonian Institution, and some of them have been described by Stejneger.[1]

Bunauan is situated in a great sunken lake and swamp region, and has a remarkable herpetological fauna. More than 120 species were found there and nearly 2,000 specimens were collected; however, about 500 of these were lost in shipping the collection from the interior to the coast. In this lot a few very rare forms, including *Draco mindanensis* Stejneger, *Tropidophorus partelloi* Stejneger, and 2 others, probably new, were lost.

The faunæ of the various islands of the Philippine Archipelago are more or less distinct; that of Palawan, as shown by

[1] *Proc. U. S. Nat. Mus.* (1908), **33**, 677; (1908), **34**, 199; (1911), **39**, 97.

Everett,[2] Boulenger,[3] Griffin,[4] and others, has more species of reptiles in common with Borneo than have the other islands. The large number of species known only from Mindanao suggests that this island has a reptilian fauna peculiar to itself. However, the knowledge of the herpetological faunæ of all the islands is very incomplete.

Fewer than 15 species and varieties of lizards have been described from the Philippine Islands since the publication of Boulenger's catalogue,[5] thirty years ago. In the present paper 14 species are described as new. These are:

Gymnodactylus agusanensis.
Gymnodactylus annulatus.
Hemidactylus luzonensis.
Ptychozoon intermedia.
Luperosaurus compresicorpus.
Lepidodactylus aureolineatus.
Emoia ruficauda.
Sphenomorphus mindanensis.
Sphenomorphus coxi.
Sphenomorphus curtirostris.
Sphenomorphus palustris.
Dasia griffini.
Tropidophorus rivularis.
Dibamus argenteus.

Dasia semicincta (Peters) has been redescribed in this paper from a splendid series of specimens. It appears to be distinct from *D. olivacea* Gray, and I doubt if the typical form of the latter occurs in the Islands. The entire collection has not been gone over, and further study will probably bring to light other new species.

Special thanks are due to Dr. Alvin J. Cox, director of the Bureau of Science, and Dr. R. P. Cowles, of the University of the Philippines, for facilitating this work; and to Mr. Artemus L. Day and Mr. S. F. Light, of the University of the Philippines, for checking identifications and assistance rendered in various other ways.

Gymnodactylus agusanensis sp. nov.

Diagnosis.—Dorsal granules intermixed with numerous large conical or trihedral tubercles, 9 or 10 irregular longitudinal rows on each side; males and females with preanal and femoral pores, those of the female much smaller; preanal pores arranged in a broadly angular series, 5 or 6 on each side; tubercles on the tail arranged in whorls.

Type.—No. R. 1686, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, June, 1913; E. H. Taylor, collector.

[2] *Proc. Zool. Soc. London* (1889), 220.
[3] *Ann. & Mag. Nat. Hist.* (1894), VI, 14, 81.
[4] *This Journal, Sec. A* (1909), 4, 595; *Sec. D* (1911), 6, 253.
[5] Catalogue of the lizards in the British Museum (Natural History, 2d ed. London (1885), 1 and 2; (1887), 3.

Description.—Rostral large, somewhat wider than high, broadly entering the nostril and almost surrounding a quadrangular median scale above, bounded above by 2 supranasals, and 2 small roundish internasals; nostrils large, directed backward with a depressed area immediately behind; nostril surrounded by the rostral, the supranasal, and 2 postnasals; scales on the snout, especially those on the canthus rostralis, much larger than those on the occiput and neck; a depressed area between and delineating the supraorbital regions continues some distance on the snout, giving it the appearance of a "nose;" eyelid not visible around the entire eye; 10 upper labials, first largest; a row of enlarged slightly keeled scales above the upper labials; 11 lower labials; mental triangular, as broad as long, a pair of rectangular chin shields bordering on the first labial and the mental, forming a suture behind the latter; several rows of enlarged scales below the lower labials, first row largest; the remaining scales on chin and throat uniformly granular; auricular opening subtriangular; tympanum deeply sunk; body above with small granules intermingled with 18 or 20 irregular rows of enlarged, conical or slightly trihedral, tubercles of varying sizes; tubercles also on the occiput, arms, legs, and tail; those on the tail arranged in whorls, not continuing to the end of the tail; scales of the tail arranged in more or less regular transverse series; 3 or 4 enlarged tubercles on each side of the anus; a glandular row of tubercles from axilla to groin, giving the appearance of a fold in the skin; ventral scales larger, imbricate, subequal in size; preanal pores in an angular series, 5 or 6 on each side; femoral pores separated from the preanals, from 8 to 10 on each side; several enlarged rows of scales in the preanal region in front and behind the preanal pores; toes with a well-defined crook, and with well-developed transverse lamellæ below, 26 under fourth toe; distance from eye to ear equal to distance from eye to nostril, and slightly greater than the diameter of the eye; hind leg pressed forward reaches between the ear opening and the insertion of the forelegs.

Color in life.—Grayish white above with 4 or 5 enlarged, irregular, dark black-brown crossbands, strongly contrasted; tail annulated with broad black rings and narrow white interspaces; a broad dark line from behind the eye joins the dark band which crosses the shoulder; a broad light line from the angle of the mouth to the shoulder; a somewhat darker band below the white line; a narrow white line from behind the upper part of the eye to a point above the ear opening, and across the occiput; head darker than the back, with a few in-

distinct light markings; labials with several small white spots; abdomen and throat yellowish white, powdered with brown; arms and legs marbled with brown; toes with dark and white spots alternating.

Measurements.—Total length (extreme end of tail regenerated), 170 millimeters; snout to vent, 88; foreleg, 36; hind leg, 48; width of head, 18.

Variations.—Several other specimens taken at the same time vary more or less in the shade of brown or light color. The markings are much the same in all the specimens; in the young the colors are almost pure black and white. In 2 specimens the rostral is fused with the "interrostral." The largest specimen, a female with regenerated tail, has the following measurements: Length, 220 millimeters; snout to vent, 106; foreleg, 40; hind leg, 55; width of head, 23. The preanal and femoral pores of the female are much smaller than those of the male.

Remarks.—The occurrence of distinct pores in the female is very unusual. So far as I know this species is unique in the family with regard to this characteristic. Boulenger, in describing the family Geckonidæ, states:[6]

> Males are generally distinguished from females by a larger size, the swelling of the base of the tail, and the presence of femoral or præanal pores, which are constantly absent in the latter.

The perforations in the scales are visible to the naked eye. Examination of the underside of the skin with a microscope showed the presence of small glands with well-defined ducts. I have not ascertained whether or not the pores are functional.

It is true that in many genera of this family, while there are no pores in the females, the scales corresponding to the pore-scales of the males are enlarged and differentiated, and it is possible to ascertain to a certain degree of accuracy the number of pores in a male of a species by an examination of female specimens. In *Gecko verticillatus* the pore scales of the females have decided pits, but I have not ascertained whether or not the scales are perforated. This characteristic, I think, does not necessitate the establishing of a new genus, although it may call for a modification of the definition.

Gymnodactylus annulatus sp. nov.

Diagnosis.—Dorsal granules minute, with from 14 to 16 irregular longitudinal rows of enlarged, conical or trihedral tuber-

[6] Catal. Lizards Brit. Mus. 2d ed. (1885), 1, 5.

cles; males with a V-shaped series of preanal pores, 3 on each side, inclosing a deep pubic groove; no femoral pores; pores wanting in the female; transverse plates under the basal phalanx large and well differentiated, 20 under the fourth toe; 12 to 14 upper labials; 11 to 12 lower labials.

Type.—No. R. 1686–7, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, July, 1913; E. H. Taylor, collector.

Measurements.—Total length, 122 millimeters; snout to vent, 56; width of head, 13; foreleg, 18; hind leg, 25. The largest specimen taken is only 141 millimeters in length.

Remarks.—A complete description of this form is hardly necessary, since it agrees in most details with G. *agusanensis* and *G. philippinicus*. It differs from the latter in its smaller size and in having 3 instead of 6 preanal pores on each side not arranged in a parallel series as in *G. philippinicus*. The plates under the basal phalanx are enlarged and clearly differentiated.

This species is very common at Bunauan, but was not observed at Butuan near the coast. More than 40 specimens were taken, all agreeing remarkably well with the type save in the shades of coloration. They were found under rotten logs and usually in pairs. They were dark when found, but quickly became lighter in color when exposed to the sunlight.

Hemidactylus luzonensis sp. nov.

Diagnosis.—Digits free and long, with 2 rows of lamellæ; distal phalanx clawed, arising from the end of the distal portion of the toe; body with about 16 rows of strong, sharply keeled trihedral tubercles; head much flattened.

Type.—No. 1774, Bureau of Science collection; Manila, Philippine Islands.

Description of type.—Adult female; head noticeably flattened, more than twice as wide as deep, neck especially constricted; rostral squarish and upright, with a slight notch above, and a suture half the width of the scale; a supranasal with a small round internasal; nostril bordered by 2 postnasals, the first labial, the supranasal, and rostral; 11 upper labials; 10 lower labials; mental almost triangular, followed by 2 pairs of greatly enlarged chin shields, the first pair making a long suture behind the mental; a few slightly enlarged scales border the lower labials and the chin shields; head scales unequal, those on snout, especially those in front of eye, largest; a few small scattered tubercles on the occiput; ear opening moderate, vertically oval; back with from 16 to 18 irregular rows of trihedral scales, largest on the sides; tail with whorls of spiny tubercles above,

below with broad transverse scales; tubercles on front legs smaller than those on hind legs; scales on chin and throat small, those on abdomen imbricate and very much larger; 8 lamellæ under longest toe; adpressed hind leg reaches beyond the elbow of adpressed foreleg; distance of ear opening and nostril from the ear, equal.

Color in formalin.—Ground color drab-gray with a few scattered brown spots; an elongate dark spot behind the eye; snout with scattered brown spots; below immaculate.

Measurements.—Total length (tail mutilated), 60 millimeters; snout to vent, 50; foreleg, 18; hind leg, 24; width of head, 11.

Remarks.—The type specimen was obtained from the Manila High School where it was being used for dissection. The abdomen has been opened and the end of the tail lost; otherwise the body is in good condition. There are no pores present, but a series of 12 differentiated preanal scales on each side probably indicates the number of pores in the male. This form is easily distinguished from *H. frenatus* by the longer inner toe, with the claw not sessile, the 8 rows of spiny tubercles on the tail, the narrowed neck, and the increased number and size of tubercles on the back. From *H. depressus* it differs in having the snout twice the diameter of the eye; the ear opening vertical and less than one third the diameter of the eye; the tail not depressed, with angular lateral edge. No other specimen having these characteristics has been seen. The type specimen was taken in Manila by a student of the High School.

Ptychozoon intermedia sp. nov.

Diagnosis.—Large scales of the dermal lobe on the side of the head equal to, or slightly smaller than, the largest abdominal scales; back with from 10 to 12 irregular longitudinal rows of flat round tubercles; tail with a narrow unsegmented terminal flap, no wider than the nearest lobes, slightly notched behind; annulations on the tail marked by lateral lobes directed somewhat backward, and a series of 4 or more enlarged scales above, much larger than the scales on the lateral lobes.

Type.—No. 1776, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, July 12, 1912; E. H. Taylor, collector.

Description.—Rostral large, rectangular, with a triangular depression in the upper part; the nostril is surrounded by the rostral, the first labial, 2 postnasals, and a rather large supranasal; latter is distinctly triangular and forms a suture with its mate behind the rostral; a large scale lies partly between the

supranasals; a small roundish scale on either side of this and directly behind the supranasals, touching the superior postnasal; 11 upper labials; 10 lower labials; mental much smaller than the rostral or any of the five first lower labials, followed by two postmental scales; latter elongate, widest in the middle; on each side of the postmental a row of scales gradually diminishing in size bordering the labials; scales from the supraocular regions on the head twice as large as those on occiput; latter area with scattered small tubercles; a group of enlarged scales directly in front of the eye, back with uniform granular scales intermixed with flat roundish tubercles, 6 or 7 irregular rows on each side; scales on belly much larger than dorsal scales, or scales on the neck; on each side of the head below the auricular opening is a dermal flap, widest in front of the auricular opening and continues from near the angle of the mouth to some distance on the neck; a similar flap on the foreleg entirely bordering the limb; the dermal flap on the hind leg is wanting from the groin to the knee; on each side of the body a wide dermal flap or parachute, extending from the fore limb, where it joins the flap of the fore limb, and continuing to the groin; tail with a lateral series of small rounded lobes decreasing in size toward the tip and directed backward "saw-tooth" fashion; tail with a flap on the tip, which is scarcely wider than the nearest lobes; each segment of tail with a number of enlarged scales; on the first half these are from 8 to 6 on each segment, on the last half the number is reduced, digits not webbed to the tips; distal phalanx on inner finger and toe replaced by a flattened scale. A series of 10 differentiated preanal scales arranged in a curved line; widely separated from these is a series of differentiated femoral scales 13 to 14 in number; a large scale on each side behind anus.

Color in life.—A soft olive gray above with touches of bluish and brown; body transversed with several wavy lines of dark brown. Head more or less flecked with brown; a broad brown band from eye to shoulder; legs indistinctly barred with reddish brown bands; below cream with large indistinct spots under the tail.

Measurements.—Total length, 189 millimeters; snout to vent, 92; length of head, 24; height of head, 10; width of head, 21; foreleg, 30; hind leg, 43; width of lateral flap, 8.5; length of femur, 15; greatest body width, 20.

Remarks.—This species seems to be intermediate between the two other known species of this genus. From *Ptychozoon kuhli* it differs in the absence of the wide flap at the extremity of

tail, and from *P. horsfeldii* it differs in having dorsal tubercles. The type specimen is a female and has no preanal pores; however, there is a distinct series of differentiated femoral scales, 14 on a side, and an angular series of 12 preanal scales, which leads me to believe that the male when found will have a similar number of femoral and preanal pores. There are 11 upper labials and 10 lower labials; the second lower labial is largest; symphysial, small and subtriangular. Markings and coloration similar to other species.

This apparently is an extremely rare species, as it is wholly unknown to the Filipinos; were it common, there would be little doubt of its being recognized by them owing to its extraordinary appearance. Only one specimen was taken, although great efforts were made to obtain other specimens in the same and other localities. This is the only record of this genus for the Philippines.

Luperosaurus compresicorpus sp. nov.

Diagnosis.—Body elongate, compressed, with a very narrow abdominal region; digits with undivided lamellæ; fingers and toes with rudimentary webs; no dorsal tubercles; chin shields very small, undifferentiated.

Type.—No. 1781, Bureau of Science collection; Limay, Bataan Province, Luzon. Collector and date unknown.

Description of type.—Rostral large, entering the nostril, a very small suture present; 2 supranasals, the first much the larger; a depressed area immediately behind the nostrils; granules on the snout and those behind and below the angle of the mouth equal to, or larger than, dorsal granules; eye large, pupil vertical; ear opening very small; the diameter of the eye equal to its distance from the ear, less than its distance to the end of the snout; 19 or 20 upper labials, 16 lower labials; mental small; chin shields small, numerous, and irregular; a somewhat enlarged row of scales bordering the lower labials; granules on the chin and throat extremely minute; scales on the abdomen juxtaposed, cycloid, and irregular, arranged in more or less regular transverse rows, about 16 in a row; a row of differentiated preanal scales, 7 on each side, probably representing the number of preanal pores in the male; each scale with a distinct depression; an angular row of larger scales immediately behind the pore scales; distal phalanx very short with retractile claws on all save inner finger and toe; undivided lamellæ under digits, 15 or 16 under the fourth finger and an equal number under the

fourth toe; lamellæ as wide at the base as at the end of digit; scales on the underside of tail very irregular in size and shape.

Color in alcohol.—Above, light cinnamon-brown, slightly darker on arms and legs; below, immaculate; tail with a slight peppering of cinnamon-brown below. No markings are in evidence.

Measurements.—Total length, 110 millimeters; snout to vent, 62; width of head, 9; greatest width of body, 7.5; foreleg, 15; hind leg, 23.

Remarks.—It is with great hesitancy that I have referred this species to the genus *Luperosaurus*, since it is unlike other species of that genus, in having a compressed body with a very narrow abdominal region. It is possible that it should be made the type of a new genus.

Lepidodactylus aureolineatus sp. nov.

Diagnosis.—Preanal and femoral pores arranged in a continuous angular series, 19 on each side; a narrow, brilliant golden line from tip of snout through eye to some distance behind eye; tail subcylindrical, with a sharp lateral edge, somewhat flattened on ventral surface.

Type.—No. 1775, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, June, 1913; E. H. Taylor, collector.

Description of type.—Rostral entering the nostril; 2 conjoined supranasals bordering the nostril above; a large postnasal; a large irregular internasal separated from the supranasals by a row of small scales; scales behind the postnasal much enlarged; mental very small; 11 upper and 10 lower labials; chin shields numerous, roundish, and subequal in size; no median groove in the forehead; tail subcylindrical, flattened below, serrated on the edge, tapering gradually.

Color in life.—Color changeable. When first taken, the back was dark brown with a series of reddish green spots beginning on the middle of the back and continuing more distinctly to the end of the tail; a narrow, bright, golden yellow line from the tip of the snout through the eye, extending to near the insertion of the front leg; tip of tongue black; belly powdered with brown. After being kept for some time, these colors changed markedly. The back became yellowish green, the spots indistinct, and blackish dots appeared about the latter; the abdomen became green, and most of the brown disappeared. When first taken, the tail was marked with reddish brown spots; on the underside brick red, powdered with brown, with indications of

narrow horizontal lines. No change was observed in the color of the tail.

Measurements.—Total length, 76 millimeters; snout to vent, 34; width of head, 7; foreleg, 9; hind leg, 15.

Remarks.—This species is allied to *Lepidodactylus lugubris*, but differs in the following details: There is no groove between the eyes, there is a much larger series of pores, there is a brilliant golden line through the eye, and the first row of chin shields is smaller than the second. From *L. labialis* it differs in the presence of femoral pores. A second specimen taken at the same locality has a regenerated tail, which is peculiar in its resemblance to that of *L. planicaudus*. The tail is especially flattened, with a free, serrated, lateral edge, the sides of which are parallel for some distance, and then taper rapidly. It is a male and agrees in all other details with the type. Stejneger does not state specifically whether pores are present in his species or not, but it is probable that it agrees with *L. lugubris* in this point. A small female specimen from the type locality agrees with the type save in the presence of pores; however, there is a series of somewhat enlarged scales equal in number to the pores in the male. This form is arboreal, and specimens were taken from the tops of felled trees. Changes in colorations and markings occur very rapidly, but the golden line through the eyes is invariable. One specimen, found on a floating branch in the river, was light yellow-green without markings. Ten specimens were collected.

Emoia ruficauda sp. nov.

Diagnosis.—Lower eyelid with an undivided transparent disk; frontoparietal single; interparietal present; supranasals widely separated, bordering nostril; 5 golden yellow lines on the body; tail pale red.

Type.—No. 1778, adult female, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, June, 1912; E. H. Taylor, collector.

Description of type.—Rostral forming a straight broad suture with the frontonasal, which is much broader than long; latter in contact with the frontal; frontal wide, little more than half as long as the parietal region; frontoparietal single, interparietal small; 4 supraoculars, the second largest; 7 or 8 superciliaries; 2 large nuchals; nostril pierced between 3 nasals; 7 upper labials, fifth very large; 6 lower labials; 2 loreals; 2 superimposed preoculars; 4 much enlarged temporals, the one

bordering the parietal largest; 3 chin shields behind the mental, second and third divided; 4 enlarged preanals; lamellæ under digits very numerous, close together except the distal part under which the lamellæ are broad and long; 62 under fourth toe; extended leg scarcely reaches the elbow; 26 rows of scales around the body, dorsals very large; ear opening moderate, obliquely oval.

Color in life.—Body coal black above with 5 golden yellow lines on the back; the median line begins on the snout and continues only to the sacral region; the dorsal-lateral lines begin just in front of the eyes and are lost on the tail; the lateral lines begin on the upper labials and continue to the groin; below bluish white; tail bright vermilion. Colors of young and adult the same.

Measurements.—Total length, 129 millimeters; snout to vent, 50; width of head, 12; foreleg, 15; hind leg, 22.

Remarks.—This species was fairly common in the upper Agusan Valley. It is very conspicuous and usually is seen in the tall grass near the rivers and lakes. A single specimen was observed at Butuan near the mouth of Agusan River. Several specimens from the type locality agree with the type in all essential details.

Sphenomorphus mindanensis sp. nov. Plate I, figs. 1 and 2.

Diagnosis.—Frontoparietal divided; interparietal present; lower eyelid scaly; 32 scales around the body; ear opening much smaller than eye opening; adpressed limbs barely touching.

Type.—No. R. 1690, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, September, 1912; E. H. Taylor, collector.

Description of type.—Rostral twice as broad as high; the width equal to that of the first labial; frontonasal forming a suture with the rostral and frontal; prefrontals large, separated; frontal nearly as broad as the supraocular region; frontoparietal distinct, elongate; parietals forming a suture behind a moderate interparietal; 5 supraoculars, the last much the smallest; 2 small scales inserted between the parietal and the last ocular; 8 or 9 superciliaries; nasal large, with nostril piercing it, followed by 2 or 3 loreals, the first highest; 7 upper labials, sixth much the largest; fifth low but long; a series of small suboculars, one entering some distance between the fourth and fifth supralabials; a large temporal bordering the parietal is bordered by 5 other enlarged scales; 2 enlarged preanals; 32 scale rows about the body; about 66 dorsal scales from occiput to above the vent in

a longitudinal row; diameter of eye much less than distance from eye to end of snout; auricular opening distinct; tympanum more or less deeply sunk; tail very slightly compressed.

Color in life.—Above light brown with a more or less regular series of indistinct, roundish, light yellowish brown spots; lateral ground color dark brown with a few small, irregular, yellowish white spots; tail similar in color to the back with larger light spots on the sides; entire ventral surface of the body immaculate creamy white.

Measurements.—Total length, 115 millimeters; snout to vent, 48; foreleg, 10; hind leg, 15.5; width of head, 7; greatest width of body, 8.

Remarks.—This species seems closely allied to *Sphenomorphus jagori*, but differs from it in being very much smaller, in the proportional lengths of the legs being different, and in having fewer scale rows. A female containing eggs is slightly smaller than the type, but otherwise the 2 specimens are similar. This species is very rare. Only these 2 specimens were seen during a year and a half at Bunauan.

Sphenomorphus coxi sp. nov. Plate I, figs. 3 and 4.

Diagnosis.—Frontoparietal single; prefrontals not in contact; 5 supraoculars; adpressed hind legs fail to reach beyond the elbow; frontal as broad as, or slightly broader than, the supraocular region; last 3 labials with distinct yellow spots.

Type.—No. 1782, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, June, 1912; E. H. Taylor, collector.

Description of type.—Rostral moderate, high, forming a short suture with the frontonasal, which is much wider than long, and in contact with the frontal; prefrontals not widely separated; frontoparietal single, followed by a narrow interparietal; nostril pierced in a single nasal and followed by 2 loreals; 2 preoculars, superimposed; 2 narrow elongate scales above the fourth and fifth labials; 5 supraoculars followed by 4 or 5 small scales inserted between the parietal and fifth supraocular, although not entirely separating them; a very much enlarged temporal bordering the parietal, with 2 or 3 smaller temporals touching its lower edge and bordering the labials; 7 upper labials, seventh largest; 6 lower labials, last much the longest; ear opening large, nearer the foreleg than the end of the snout; several pairs of chin shields; 36 rows of scales around the body; 22 lamellæ under the fourth toe; 2 enlarged preanals; medial row of scales

under the tail only slightly enlarged; adpressed hind leg fails to reach the adpressed elbow of the foreleg.

Color in life.—Above reddish brown with a series of about 12 darker bands across the body, indistinct above, but darker on the sides, especially on the head and neck, where the ends appear as a series of large black spots; a series of light spots on the labials, those on the last 3 labials bright yellow; tail variously barred with very narrow indefinite bars of a darker color; lower part of the tail dull purplish pink; small brown spots on the neck; belly immaculate. In young individuals the tail is pinkish.

Measurements.—Total length, 166 millimeters; snout to vent, 66; width of head, 11; width of body, 14; foreleg, 18; hind leg, 25.

Remarks.—This species superficially resembles *Sphenomorphus jagori* from which it is easily distinguished by the undivided frontoparietal. *Spenomorphus coxi* is common in the swamps and on the sides of the low mountains near Bunauan. Twenty-six specimens were collected. The species is named for Dr. Alvin J. Cox, director of the Bureau of Science.

Sphenomorphus curtirostris sp. nov.

Diagnosis.—Limbs well developed; lower eyelid scaly; tympanum distinct; no supranasals; nostril pierced in a single large nasal; snout short and blunt; frontoparietals fused in a single large plate; parietals forming a suture behind the internasal; frontonasals separated or forming a suture.

Type.—No. R. 1695, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, September 8, 1912; E. H. Taylor, collector.

Description of type.—Rostral twice as wide as high, narrowed on the ends to the width of the first labial; frontonasal twice as broad as long, forming a broad suture with the rostral; prefrontals narrowly separated, hexagonal in shape; width of the frontal equal to, or slightly larger than, the supraocular region; first 2 supraoculars touching the frontal; 4 supraoculars (5 on the left side); nasal large, bordered behind by 2 loreals, superimposed; diameter of eye equal to the distance from eye to end of snout; frontoparietal a single plate; parietals forming a long suture behind the interparietal; 7 upper labials unequal in size; 2 or 3 rows of rather large unequal scales separating the labials from the eye; a very large temporal bordering the parietal; bordered behind and below by 5 enlarged scales; 10

or 11 superciliaries; a rather large scale inserted between the prefrontal and the first supraocular; 6 lower labials; mental twice as wide as high, followed by a very large unpaired chin shield; 2 or 3 pairs of enlarged chin shields behind the latter; auricular opening large, tympanum not deeply sunk; hind leg equal to the distance from the foreleg to the snout; adpressed hind leg fails to reach the elbow of adpressed foreleg; toes somewhat compressed, with transverse, smooth lamellæ, 14 under the fourth toe; heel bordered by several enlarged scales; 40 rows of smooth scales around the body, largest on the ventral side; tail somewhat longer than head and body, slightly compressed, tapering to a sharp point.

Color in life.—Body above variegated yellowish brown, with a median row of narrow, quadrangular, chocolate-brown spots, continuing in a median line from the head to the sacral region; 2 or 3 narrow indistinct brownish lines on either side of the median spots; a wide dark brown lateral line begins on the snout, continues through the eye along the side to the hind leg, more or less dove-tailed with the lighter dorsal color covering the entire side of body; tail of somewhat lighter color with irregular darker blotches on the sides; arms and legs mottled above; ventral surface yellowish white with small brown spots, largest and most numerous under the tail.

Measurements.—Total length, 98 millimeters; snout to vent, 44; width of head, 7; foreleg, 10.5; hind leg, 15.

Remarks.—This form is closely allied to *Lygosoma decipiens* Boulenger and to *Sphenomorphus steeri* Stejneger. Specimens of both species are at hand for comparison. From the former it differs in markings, the width of the head, the size of the preanals, and in the number of scales rows; from *S. steeri* it differs chiefly in size. Several specimens of this species from the type locality agree in essential details, save that the nasals are separated in about one half of the specimens and form a suture in the others. This species is common on the low mountains near Bunauan.

Sphenomorphus palustris sp. nov.

Diagnosis.—Frontoparietal divided; 6 supraoculars, the last 2 divided; lower eyelids scaly; ear opening large, round; tympanum not deeply sunk; frontal slightly longer than the parietal region; 40 scale rows around the body; side of head barred with white.

Type.—No. 1687, Bureau of Science collection; Bunauan, Agu-

san Province, Mindanao, September 16, 1912; E. H. Taylor, collector.

Description of type.—Rostral flattened above, broader than high, forming a narrow suture with the frontonasal; prefrontals nearly square, not meeting; frontal long, very narrow behind; not wider than the supraorbital region, but longer than the parietal region; frontoparietal plate divided; parietals forming a suture behind the elongated interparietal; both ends of the latter sharply pointed; supraoculars 6, the last 2 divided; nasal large, touching first 2 labials; an elongate loreal immediately behind followed by a second loreal, larger than the first; 2 enlarged preoculars; 8 upper labials, the seventh largest; 7 or 8 lower labials; mental moderate, followed by 2 chin shields, the second divided; a row of 3 enlarged suboculars under the fore part of the eye with a smaller series beginning behind these and continuing to the supraoculars behind the eye; 9 superciliaries, the first largest, the last 5 subequal; a large temporal bordering the parietal, with 2 temporals below, and 2 behind the lower end, subequal in size; 40 rows of scales around the body, laterals smallest; scales on the hind limb greatly reduced; 30 keeled lamellæ below the fourth toe; 2 somewhat enlarged transverse plates on the wrist; 2 enlarged preanals; diameter of orbit equal to length of snout; hind leg pressed forward, reaches to near the elbow of adpressed foreleg.

Color in life.—Mottled brown above with scales of darker and lighter shades; sides darker, with indistinct, irregular, bluish bars, distinguishable across the back; area in front of the arm bluish; head uniform light brown above; 3 white transverse bars on the side of the head and 3 or 4 dark-chocolate bars alternating with the white; the most distinct white line begins on the white lower eyelid and continues down through the seventh labial and is lost on the chin; tail and hind leg dark bluish to black; chin creamy white, neck with a bluish tinge; abdomen dirty brownish white.

Measurements.—Total length (tail mutilated and partly regenerated), 159 millimeters; snout to vent, 95; width of head, 16; foreleg, 24; hind leg, 35.

Remarks.—This species is related to *S. jagori,* but differs in many essential points. More than 100 specimens of the latter which were taken at Bunauan agree remarkably in scalation and coloration. Two specimens of *S. palustris* were taken several kilometers apart in the large swamp near Bunauan. These 2 specimens agree in scalation, but the coloration of the hind

legs and tail of the cotype is bluish rather than black. There is no trace in this species of the distinctive markings of *S. jagori.*

Dasia griffini sp. nov. Plate I, figs. 5 and 6.

Diagnosis.—Similar to *Dasia semicincta*, but with a very much shorter head and more pointed snout; much narrower across the orbital region; the frontal longer than frontoparietal and interparietal together; scales in 26 rows around the body; scales larger than in *D. semicincta;* supranasals with a broad suture.

Type.—No. 1777, Bureau of Science collection; Taytay, Palawan; L. E. Griffin, collector.

Description of type.—Rostral normal, much wider than high; supranasals present, forming a suture; frontonasal broader than long, touching the frontal; frontal long and narrow; interparietal present, separating the parietals; frontoparietal divided; 3 nuchals present; nasal rectangular, as long as the first labial, followed by 2 loreals subequal in size; 6 or 7 superciliaries; 4 supraoculars; 7 upper labials, fifth largest; 7 lower labials; ear opening small with 1 large anterior lobule; temporals small, 3 or 4 in number; 18 lamellæ under the fourth toe; adpressed hind leg fails to meet the wrist of adpressed foreleg.

Color in alcohol.—Greenish drab above with a series of 15 transverse bars of black beginning midway on the side; tail indistinctly mottled; a lighter streak dorsolaterally along the body to base of the tail; below this line black; under part of the body immaculate light blue.

Measurements.—Total length (tail regenerated), 224 millimeters; snout to vent, 111; foreleg, 30; hind leg, 39.

Remarks.—Two other specimens were taken in Palawan which agree with the type in scales and markings, but differ somewhat in coloration. The 3 specimens are adult. This species is easily distinguished from *Dasia semicincta* by the much shorter head, the smaller number of scale rows, and the markings. This species is named for its collector, Dr. Lawrence E. Griffin, formerly professor of zoölogy in the University of the Philippines.

Dasia semicincta (Peters). Plate I, figs. 7 and 8.

> *Euprepes* (*Titiqua*) *semicinctus* PETERS, Monatsberichte d. Acad. d. Wissensch. in Berlin (1867), 21.

Boulenger has referred this species to *Dasia olivacea* Gray. The taking of a number of specimens has confirmed my belief

in the distinctness of the species. The specimens collected agree in scales and proportions, but vary in markings and coloration with the age. They agree in practically all details with Peters's description. The following is a description of a large adult male:

Description.—Rostral high; the supranasals constantly form a suture; prefrontal large, as wide as long, making a narrow suture with the frontal; prefrontals narrowly separated; frontal bordered by the first 2 supraoculars; first superciliary large, easily mistaken for a supraocular; frontoparietals and interparietal distinct, the latter separating the parietals; a pair of nuchals; nasal rectangular, as long as first labial, followed by 2 loreals, second much the larger; 2 enlarged scales under the fore part of the eye; 4 supraoculars, second largest; 7 superciliaries, first very large; 7 supralabials, fifth largest, entering the eye; 3 temporals the size of the seventh labial; mental large, followed by an unpaired chin shield and 2 large paired shields; 7 lower labials; ear opening small, nearer the foreleg than the snout; 30 rows of scales around the body; preanals somewhat enlarged; the adpressed hind leg reaches beyond the wrist of adpressed foreleg. Dorsal scales, at least those on the posterior half of back, tricarinate, occasionally quinquicarinate.

Color in life.—Owing to the extreme variation I append descriptions of specimens of various ages. Young (extreme tip of tail regenerated): Length, 132 millimeters. Body above glossy coal black with a series of brilliant orange-yellow bars from the tip of the snout to the end of the tail; 3 bars in front of eye, first on the rostral; 2 in front of eye; 2 between the eyes, having only a single representative below the eye; the sixth lies across the occipital region passing through the corners of the mouth; 2 or 3 bars across the neck; 6 on the body in front of the hind leg, with 13 much wider bars on the tail; the latter bars are more orange than yellow; legs and digits barred with canary yellow; regenerated tail brick red; below, the bars widen and loose themselves in the immaculate canary yellow of the abdomen, giving the appearance ventrally of a series of black belts, the ends of which are pointed and fail to meet. In a specimen 180 millimeters long (snout to vent, 76 millimeters), these markings are still very distinct; however, in a specimen measuring from snout to vent 92 millimeters (tail broken and regenerated), the characteristic markings of the young are scarcely distinguishable save a series of lateral bars of ocellated black and cream, scarcely traceable dorsally. These are the remains

of the orange bars across the body of the young; below, bluish yellow. In a large adult (275 millimeters long) the color is olive brown above with a series of 6 lateral bars of ocellated scales, widely separated from their fellows dorsally. Traces of annulations are visible on the tail; bluish beneath. Other specimens agree in markings and coloration with these according to their ages.

Specimens of this species were collected from the tops of large felled trees. It is a retiring species and is never observed on the ground.

Tropidophorus rivularis sp. nov. Plate I, figs. 9 and 10.

Diagnosis.—Head scales feebly rugose; 4 supraoculars; no supranasals; a series of small granular scales inserted in a groove above the front labials, separating the second loreal and the anterior suboculars from the labials; 2 interparietals, the first small, followed by an elongate interparietal completely separating the parietals; sixth labial very large, below the eye.

Type.—No. 1780, Bureau of Science collection; Bunauan, Agusan Province, Mindanao, June, 1912; E. H. Taylor, collector.

Description of type.—Rostral small, little wider than high; prefrontals forming a broad suture; frontal elongate, narrower than the supraocular region; nasal small, followed by 2 loreals, the second loreal separated from the labials by a series of granular scales; 5 labials in front of subocular, the first smallest; 8 upper labials, the sixth much the largest; mental small, equal in size to the rostral; a single unpaired chin shield behind the mental, followed by 2 paired shields lying close together, and a third pair separated by 3 elongate scales; temporals 5, slightly enlarged, none as large as the seventh labial; auricular opening large, more than half the diameter of eye; dorsal scales strongly unicarinate; a single large preanal; 30 scale rows on the body; adpressed hind leg reaches beyond the elbow of the adpressed foreleg.

Color in life.—Body above reddish brown, barred across the back with a series of indistinct, irregular cross bands, not visible on the sides; sides darker with traces of light bars of bright yellow; scales flecked with small yellow or orange spots; an orange spot behind the ear, another between the eye and the ear; head lighter brown without markings; lips and underside of throat and chin grayish blue; abdomen and underside of limbs yellowish white; under base of tail, pinkish.

Remarks.—This species is related to *T. misamisensis* Stejneger, but differs in having a double interparietal, in the character

of the temporals, and in having a series of small scales in a groove above the front upper labials. These characters appear to be constant and are present in both young and adult specimens of a large series. The species is common near small mountain streams where it lives under rocks and logs, but takes to the water at once on being disturbed. A specimen was observed to swim under water in a clear pool for about 7 meters; it then took refuge under a large rock, where it remained for more than two minutes. These lizards swim by alternating movements of the arms and legs and an undulating movement of the body and tail.

Dibamus argenteus sp. nov. Plate I, figs. 11 and 12.

Diagnosis.—Snout covered with a single large rostral, pierced by the nostril; body elongate with limbs absent; 24 scale rows around the body, scales equal on body, but slightly smaller on the tail. Width of tail contained in its length five and two-thirds times.

Type.—No. 1691, Bureau of Science collection; Butuan, Agusan Province, Mindanao, May, 1913; E. H. Taylor, collector.

Description of type.—Snout covered with a single large rostral pierced by elongate nostrils; a strong suture emerges from the nostril and continues backward in an irregular line to a point opposite the eye; behind the rostral all scales imbricate; a frontal shaped like a double convex lens forms a suture with the rostral; bordered on each side by 2 oculars and behind by a somewhat larger interparietal scale, as wide as, and a little longer than, the frontal; oculars elongated, slightly smaller than the frontal; eye appears as a clouded black dot, opposite the suture in rostral; behind the ocular is a somewhat enlarged scale and below it an enlarged labial forming a suture with the rostral; mental narrow, a little longer than wide, with 2 enlarged labials on each side extending farther back than the rostral; these scales followed on each side of the head by 2 elongate scales opposite the first upper labial; rostral, mental, and lower labials noticeably thickened; 24 scale rows around the body; 250 scales in a longitudinal line from head to tail; scales around the body equal in size, slightly smaller on the tail; preanal small, but preceded by 2 or 3 large scales.

Color in life.—Light chocolate brown above and below, with irregular blotches of silvery gray, 2 of which entirely encircle the body; anal region creamy white; frontal plate silvery gray; rostral, mental, and lower labial light.

Measurements.—Total length, 125 millimeters; snout to vent, 108; tail, 17; width of head, 4.5.

Remarks.—While no specimen of *D. novæ-guineæ* is at hand for comparison, I have no doubt as to the distinctness of this species. The difference in the proportional length of the body and tail is especially evident, while the position and distinctness of the eye, the smaller size of the interparietal, and the coloration are all distinctive characters. The head is not depressed, but is the same thickness from end of snout to the neck. A single specimen was found on a small rocky hill emerging from the great swamp not far from the mouth of Agusan River. This is the first record of this family and genus in the Philippines. A second specimen has been taken on Canlaon Volcano on the Island of Negros, at an elevation of about 915 meters.

ILLUSTRATIONS

[Drawings by T. Espinosa]

Plate I

Figs. 1 and 2. *Sphenomorphus mindanensis* sp. nov. ×2. From the type, No. 1690.

3 and 4. *Sphenomorphus coxi* sp. nov. ×1. From the type, No. 1782.

5 and 6. *Dasia griffini* sp. nov. ×1. From the type, No. 1777.

7 and 8. *Dasia semicincta* Peters. ×1.

9 and 10. *Tropidophorus rivularis* sp. nov. ×1. From the type, No. 1780.

11 and 12. *Dibamus argenteus* sp. nov. Much enlarged. From the type, No. 1691.

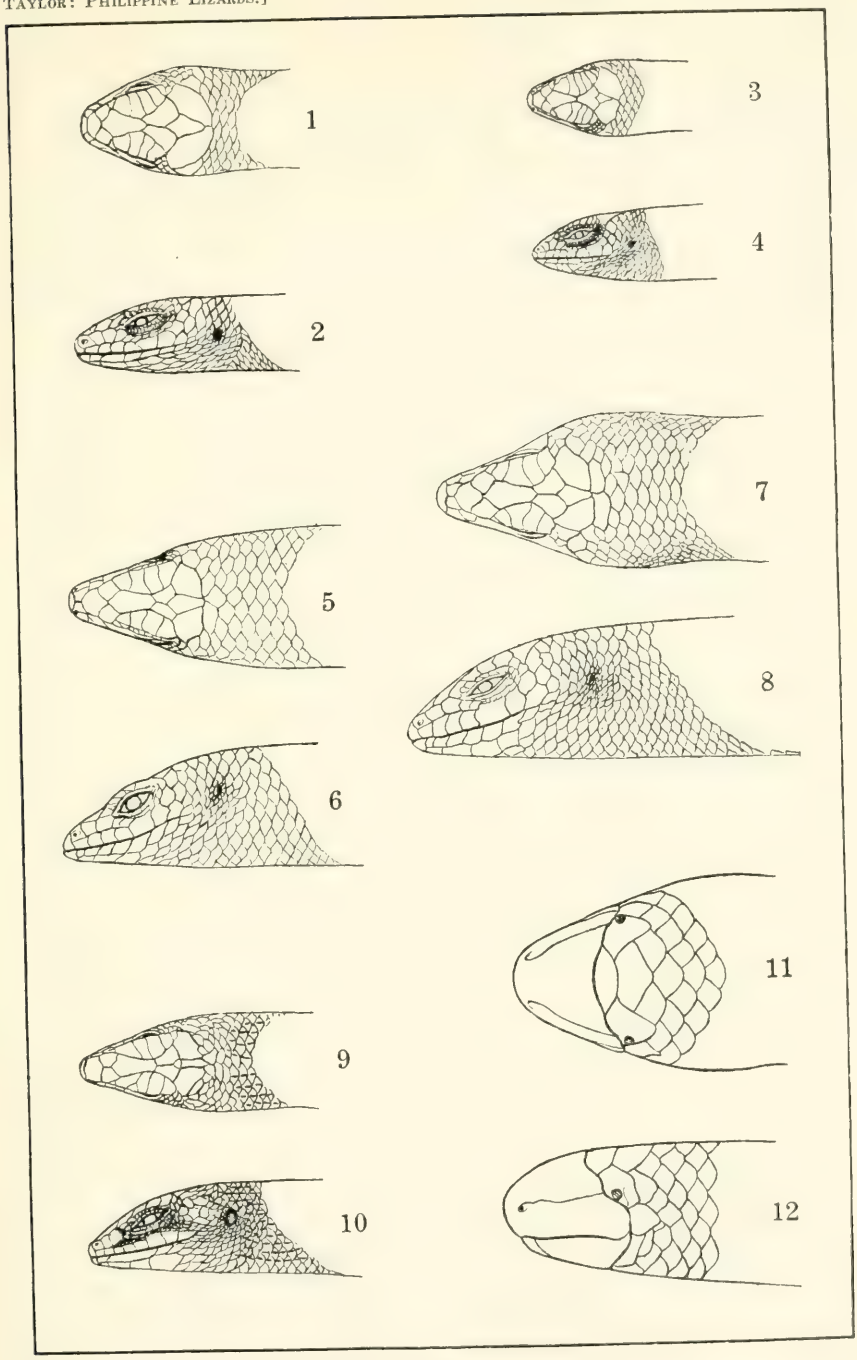

PLATE I.

Figs. 1 and 2. Sphenomorphus mindanensis sp. nov. 3 and 4. Sphenomorphus coxi sp. nov. 5 and 6. Dasia griffini sp. nov. 7 and 8. Dasia semicincta Peters. 9 and 10. Tropidophorus rivularis sp. nov. 11 and 12. Dibamus argenteus sp. nov.

THE EGGS OF ASCARIS LUMBRICOIDES

By Lawrence D. Wharton

(From the Zoölogical Laboratory, College of Liberal Arts, University of the Philippines)

In the microscopical examination of fæces for the eggs of *Ascaris lumbricoides* a number of atypical forms of eggs are often found of which the origin has not been explained. In numerous attempts to account for their presence, different authors have even suggested that the most atypical forms are produced by another species of worm. While working in the laboratory with live *Ascaris*, I have been able to obtain eggs in large numbers, under conditions which serve to throw considerable light on the production of these atypical forms. In this paper I shall describe the methods by which I have obtained eggs from living *Ascaris*, the various forms of eggs which are found in fæces and which may be obtained in the laboratory, and the experiments in which the atypical eggs have been produced.

I have been able very frequently to obtain living *Ascaris lumbricoides* from autopsies at the city morgue, through the kindness of Dr. B. C. Crowell, of the College of Medicine and Surgery. When the worms are placed immediately in Kronecker's solution,[1] they live for from five to twelve days at the temperature of the laboratory (25° to 35° C.), and the females continue to lay eggs for some days. To obtain eggs for experiment, healthy-looking, adult females were placed, separately, in glass dishes of the solution, and the dishes were covered with glass plates. The solution was changed each day, and a record was kept of the kind of eggs laid by each individual. No attempt was made to keep them in the dark during the daytime, and I found that the eggs were generally, although not always, laid at night. To make sure that the females used in the experiments carried fertilized eggs, they were generally taken from a host harboring both male and female worms. In some cases a male was kept

[1] Common salt, 6 grams; caustic soda, 0.06 gram; distilled water, 1,000 cubic centimeters. I do not consider this solution a very good medium for *Ascaris*, but it is the most satisfactory one of which I know. If placed in water, the worm absorbs so much that in about twenty-four hours the body wall bursts and the *Ascaris* dies.

in the same dish with a female, but this did not seem to influence the number or condition of the eggs laid.

Typical eggs of *Ascaris lumbricoides* are more or less oval in form. They average about 70 micra in length and 50 micra in thickness, although the variation in size and curvature is rather great. The egg consists of a central mass of protoplasm and yolk with a very thin vitelline membrane, surrounded by a thick transparent shell consisting of an inner layer of chitin and an outer layer of some albuminous material. The chitinous inner shell is made up of two parts, a thin, tough, very refractive layer, and a thicker, more brittle, outer layer which often shows very delicate striations. The egg does not entirely fill the shell, but forms a round ball in the center with a clear space at each end. The polar bodies often may be seen in one of these clear spaces in a newly laid egg.

On the outside of the chitinous shell is a thick layer of albuminous material, which is raised all over the surface into small, round, blunt protuberances, producing a very characteristic mammillated appearance. This layer is colorless in eggs laid in the laboratory, but in the fæces it generally is colored by the bile pigment. It adheres very tightly to the chitinous part of the shell, and I have never been able to remove it without destroying the egg. When the eggs are first laid, this outer layer is sometimes very soft and sticky, and this fact accounts for one of the commonest atypical forms which is found in the fæces. This is the form in which the mammillations are missing and the albuminous layer is denser than in the typical mammillated form. This condition may be produced by shaking together freshly laid mammillated eggs or by rolling them about between two smooth surfaces while they are still soft. The mammillations are smoothed down, and the layer becomes more compact. It seems very reasonable to suppose that the same thing may occur sometimes in the intestine, particularly if the eggs be laid a little prematurely.

Another atypical form which is often found in fæces differs from the typical eggs in that the outer albuminous layer of the shell is entirely absent, and the surface, which is formed by the outer chitinous layer, is perfectly smooth. Eggs of this kind are the most difficult to diagnose, as they are easily mistaken for the eggs of other forms of worms, and there even has been some doubt as to whether they were the eggs of *A. lumbricoides* or of some closely related species. It is suggested by some authors that these eggs are produced by the shelling off of the

albuminous layer in the intestine by pressure or by the rubbing of the eggs against one another. I have tried to remove this layer from the eggs by various mechanical means, but have never succeeded. Shaking or rubbing the eggs together or rolling them about between two surfaces may smooth down the mammillations, but it never removes the albuminous layer from around the shell. The eggs may be broken, but the two layers of the shell remain tightly attached, so I feel safe in saying that their condition is not due to pressure.

This form of egg is also often obtained when eggs are laid in Kronecker's solution under certain conditions. Table I is a record of the eggs laid by 56 individuals of *Ascaris lumbricoides* kept in the solution in the laboratory. This table shows the conditions under which the atypical eggs are laid. Of the 56 worms, 13 did not lay eggs. Two, Nos. 19 and 38, laid only unfertilized eggs. All the others laid at least once, and the majority laid several times. In all cases except Nos. 26, 27, 28, and 29 from autopsy 3136 and No. 34 from autopsy 3137 the first laying consisted of typical 2-layered mammillated eggs. In the succeeding layings the outer albuminous layer became much thinner and less typical, and in the majority of cases where laying continued for several days it disappeared entirely, and only eggs with a smooth surface, without the albuminous layer

TABLE I.—*Eggs laid by Ascaris lumbricoides in Kronecker's solution.*

No. in series.	Autopsy No. of host.	Date obtained.	Day.											
			1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1	3104	Apr. 4	×	×	×	O	×—	—	U—	O	D			
2	3104	....do....	×	O	O	UY	UY	UY	O	O	D			
3	3104	....do....	×	O	O	O	O	O	×—	O	D			
4	3104	....do....	×	O	O	×—	D							
5	3104	....do....	×	O	—	O	D							
6	3110	Apr. 7	O	O	O	O	D							
7	3113	....do....	×	×	×	×	O	×	D					
8	3113	....do....	×	O	×	O	O	O	D					
9	3113	....do....	×	×	×	O	O	×	D					
10	3113	....do....	×	×	×	K								
11	3113	....do....	O	×	O	×	O	—	D					
12	3113	....do....	×	O	×	×	O	D						
[a]13	3114	Apr. 8	O	×	×	O	×—	O	D					
[a]14	3114	....do....	O	×	×	O	×	O	O	D				
[a]15	3114	....do....	O	O	×	O	×—	O	O	D				
16	3118	Apr. 13	O	O	O	D								
17	3118	....do....	O	O	D									
18	3118	....do....	O	O	O	O	O	O	D					
[b]19	3125	Apr. 14	O	O	O	O	O	O	O	U—	O	D		

TABLE I.—*Eggs laid by Ascaris lumbricoides in Kronecker's solution*—Contd.

No. in series.	Autopsy No. of host.	Date obtained.	Day.											
			1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
20	3126	Apr. 15	×	×	O	O	×—	O	—	O	O	O	D	
21	3126	....do....	O	O	O	O	D							
22	3126	....do....	O	×	O	O	D							
23	3126	....do....	O	O	O	O	×	O	D					
24	3126	....do....	O	O	O	O	D							
[b]25	3131	Apr. 17	O	O	O	O	D							
26	3136	Apr. 20	O	O	O	O	D							
27	3136	....do....	O	×—	O	K								
28	3136	....do....	O	O	×—	×—	D							
29	3136	....do....	—	O	O	D								
30	3136	....do....	O	×	× —	—	D							
31	3137	Apr. 22	O	×	×	K								
32	3137	....do....	O	×	×	O	—	O	O	O	O	O	D	
33	3137	....do....	×	K										
34	3137	....do....	O	×—	×—	K								
35	3137	....do....	O	O	O	O	×—	O	×	O	O	—	K	
36	3137	....do....	O	×	O	O	×	O	×—	O	O	× —	—	K
[a]37	3137	....do....	×	×—	×—	K								
[a]38	3139	Apr. 24	U—	O	O	O	O	O	O	D				
[a]39	3139	....do....	×	O	×—	D								
[a]40	3139	....do....	O	×	O	O	O	O	O	D				
[a]41	3139	....do....	O	K										
[a]42	3139	....do....	O	O	O	O	×	O	O	D				
[a]43	3139	....do....	×	O	×	O	—	O	O	D				
[a]44	3139	....do....	×	O	×	O	×	O	O	D				
[a]45	3139	....do....	O	O	×	O	O	O	O	O	D			
[a]46	3139	....do....	×	O	O	O	O	O	O	O	—	K		
[a]47	3139	....do....	×	O	×	O	×	O	O	×—	—	—	—	D
[a]48	3139	....do....	O	×	O	O	O	O	O	O	D			
49	3145	Apr. 25	O	O	O	O	O	O	O	K				
50	3145	....do....	O	O	O	O	O	O	O	D				
51	3145	....do....	O	×	O	×	O	O	×	K				
52	3145	....do....	×	O	O	×	O	—	O	D				
53	3145	....do....	O	O	O	O	O	O	D					
54	3145	....do....	O	O	O	O	O	O	O	D				
[a]55	3154	Apr. 29	O	O	O	×	O	O	D					
56	3154	....do....	O	O	O	O	×	×—	D					

[a] Male kept in the salt solution with the female.

[b] Found alone in the intestine of the host.

O No eggs laid.

U Unfertilized eggs only laid.

× Typical mammillated eggs.

Y Eggs on which the albuminous layer is very thin and in some cases lacking.

— All eggs without albuminous layer of shell.

NOTE.—In many cases after the first or second layings part of the eggs laid were unfertilized. No record is made of unfertilized eggs except in those cases where they were all unfertilized.

D Died.

K Killed.

resulted. I kept these eggs from a number of different individuals and found that they developed in the same manner and in the same length of time as the typical eggs. In fact, it was impossible to find any difference between the two kinds of eggs except the total absence of the albuminous layer in the second form. As this layer of the shell is produced only in the anterior part of the uterus after the chitinous layer has been deposited, its absence has no effect on the protoplasm of the egg. The absence of the albumen from the surface must be due to some physiological condition which prevents the formation and deposition of the required substance by the uterine glands. What this condition is I am unable to state. That it is not due solely to a lack of nutritive material in the solution is indicated by the fact that eggs of this form are sometimes found in the fæces of perfectly healthy well-nourished persons, while in poorly nourished and diseased persons the eggs may all have the typical mammillated layer of shell. Although this experiment fails to show why these atypical eggs are produced, it conclusively shows that they are produced by *Ascaris lumbricoides*, if the proper conditions arise, and that their presence in the fæces is not due to the presence of any other species of worm or any particular variety of *Ascaris lumbricoides*.

In addition to the above-mentioned forms, unfertilized eggs are also frequently found. These may be distinguished readily by the fact that the protoplasm of the egg is not surrounded by a vitelline membrane and completely fills the shell. It is also much more vacuolated than in the fertilized eggs. The shell of the unfertilized eggs may present any of the conditions found in the fertilized eggs. In addition, both layers of the shell are sometimes absent in the unfertilized eggs laid in Kronecker's solution, but eggs in this condition are not likely to be found in fæces as they would be destroyed very quickly by the juices of the intestine or by the pressure of its contents and would not succeed in passing out unbroken.

ZUR STAPHYLINIDENFAUNA DER PHILIPPINEN: VI. BEITRAG ZUR KENNTNIS DER INDO-MALAYISCHEN FAUNA

Von Max Bernhauer
(*Horn, Nieder Oesterreich*)

Herr Professor C. F. Baker, der unermüdliche Erforscher der Philippinen, hatte die Freundlichkeit abermals eine Partie von ihm gesammelter Staphyliniden zur Bearbeitung einzusenden. In dem ich demselben hiefür meinen besten Dank sage, übergebe ich die in dem hochinteressanten Material vorgefundenen Neuheiten der Öffentlichkeit.

Osorius bakeri sp. nov.

Unter den Arten mit nicht ausgebuchteten Halsschildseiten durch den äusserst dicht und gleichmässig längsgestreiften Kopf und die zwei seitlichen fast xapfenförmigen Fortsätze der Stirn leicht zu erkennen. Von der normalen glänzend pechschwarzen *Osorius*-Farbe, die Fühler, Taster und Beine rostrot. Kopf etwas schmäler als der Halsschild, ausser der glatten Scheitelpartie mit scharfen, kielförmigen, die ganze Länge einnehmenden Längsstrichen sehr dicht besetzt, nur ober der Fühlerwurzel in geringerer Ausdehnung geglättet, vorn tief bogig asymetrisch ausgeschnitten, die Seiten in lange, breite, spitzwinkelige Fortsätze ausgezogen, von denen der rechte länger, weniger breit und schärfer spitzwinkelig ist. Halsschild in der vorderen Hälfte breiter als die Flügeldecken, nach rückwärts geradlinig verengt, wenig breiter als lang, vor den Hinterecken mit breit abgesetzter Seitenrandkehle, ziemlich fein und spärlich, unregelmässig punktiert, zu beiden Seiten der unpunktierten Mittelzone mit je einer feinen Dorsalpunktreihe. Flügeldecken etwas länger als der Halsschild, ohne deutliche Punktierung, nur mit wenigen flachen undeutlichen Punkten besetzt. Hinterleib ziemlich fein und spärlich punktiert und mit einzelnen sehr fein eingegrabenen Querstricheln.

Länge, 6–6.25 mm.

Luzon, Laguna, Mount Maquiling.

Osorius maquilinganus sp. nov.

Mit dem vorigen sehr nahe verwandt, halb so klein, der Kopf weniger dicht und weniger ausgedehnt längsgestrichelt, der

Höcker über der Fühlerwurzel in grösserer Ausdehnung geglättet, neben demselben nicht gestrichelt, die Stirnfortsätze sind schmäler und erscheinen dadurch länger. Der Halsschild ist vor den Hinterecken nicht so stark und breit abgesetzt, die Seitenrandkehle viel schmäler, die Punktierung ist weniger spärlich. Auf den Flügeldecken ist die Skulptur auch weniger undeutlich und weniger spärlich.

Länge, 5.75 mm.

LUZON, Laguna, Mount Maquiling (1 Exemplar).

Osorius philippinus sp. nov.

Unter den Arten mit geradlinigen Seiten durch die Färbung und die Skulptur des Kopfes und Halsschildes gleich ausgezeichnet und kaum mit einer anderen Art zu verwechseln. Pechschwarz, Halsschild, Abdomen, der Vorderrand des Kopfes, die Fühler, Taster und Beine rötlichgelb, glänzend. Der Kopf ist mit Ausnahme der glatten hinteren mittleren Stirnpartie und der Fühlerhöckerchen sehr fein aber deutlich chagriniert, nur matt glänzend, mässig dicht mit sehr feinen, nicht zu langen Längsstrichelchen in der Partie zwischen den Augen. Halsschild wenig breiter als lang, nach rückwärts von den Vorderecken angefangen in fast gerader Linie verengt, verkehrt trapezförmig, mit schmal abgesetzter Seitenrandkehle, sehr fein und spärlich punktiert, in den Dorsalreihen in der Mitte mit je einem schmalen Längseindruck, in welchem einige grobe Punkte eingestochen sind. Flügeldecken kaum länger als der Halsschild, fast quadratisch, sehr undeutlich und spärlich skulptiert. Hinterleib fein und spärlich punktiert, überdies längsgestrichelt.

Länge, 4 mm.

LUZON, Laguna, Mount Maquiling.

Osorius luzonicus sp. nov.

In die Nähe des *Osorius cribrum* Fauv. gehörig, jedoch nur höchstens ein Fünftel so gross, die Stirn ist vorn nicht wie bei diesem in der Mitte zahnförmig vorgezogen, sondern gerade abgestutzt, die Strichelung ist feiner und weitläufiger. Der Halsschild ist dem des *O. cribrum* sehr ähnlich gebildet, die Punktierung aber ist feiner und weniger tuberkelartig. Endlich sind die Flügeldecken etwas weitläufiger punktiert.

Länge, 3.75 mm.

LUZON, Laguna, Mount Maquiling.

Osorius minutus sp. nov.

In der Skulptur des Kopfes mit *Osorius minutissimus* Bernh. fast übereinstimmend, durch mehr als doppelt so grosse Gestalt, breiteren und kürzeren Halsschild, viel breitläufiger und feiner punktierten Halsschild und längere weitläufiger skulptierte, glänzendere Flügeldecken sofort zu unterscheiden. Der Halsschild ist deutlich breiter als lang, sehr fein und weitläufig punktiert, die glatte Mittellinie nur mässig scharf abgesetzt. Die Flügeldecken sind der Länge nach lang-gerunzelt, an den Seiten in der Schulter beginnend in eine stumpfe Längsfalte aufgeworfen.

Länge, 2.75 mm.

LUZON, Laguna, Mount Maquiling.

Stenus (Hypostenus) smaragdinus sp. nov.

Eine reizende durch die Farbe sehr ausgezeichnete neue Art. Schwarz, die ganze Oberseite hellgrün erzglänzend, die ganzen Fühler, Taster und Beine licht rötlichgelb. Kopf sehr breit, fast breiter als die Flügeldecken, mit erloschenen Stirnfurchen, grob und mässig dicht punktiert, mit 3 kurzen geglätteten Längserhabenheiten in der Mitte und ober den Fühlerwurzeln. Fühler kurz, die Keulenglieder wenig länger als breit. Halsschild viel schmäler als die Flügeldecken, um ein Drittel länger als breit, an den Seiten gleichmässig gerundet, oben ziemlich gleichmässig gerundet ohne Eindrücke, grob und nicht allzu dicht, gleichmässig punktiert, glänzend. Flügeldecken kürzer als der Halsschild, an den Schultern abgerundet, nach rückwärts schwach verengt, noch gröber und etwas weitläufiger punktiert als der Halsschild, glänzend. Abdomen glänzend, stark, an der Basis der Tergite dicht, in der Apikalhälfte weitläufig, am 7. Tergit ziemlich gleichmässig und ziemlich dicht punktiert.

Länge, 3.75 mm.

LUZON, Laguna, Los Baños.

Stenus tropicus sp. nov.

♀ : Ebenfalls in die *Hypostenus*-Gruppe gehörig, durch die Färbung, den breiten Kopf und die gleichmässig dichte Punktierung des ganzen Körpers recht ausgezeichnet. Tiefschwarz, mässig glänzend, die Fühler bis auf die schwärzliche Spitze, die Taster und die ganzen Beine rötlichgelb. Kopf fast breiter als die Flügeldecken, mit sehr grossen Augen, ausgehöhlt ohne Stirnfurchen, ober den Fühlerwurzeln mit einer geglätteten kur-

zen Längserhabenheit, grob und dicht, gleichmässig punktiert. Halsschild viel schmäler als die Flügeldecken, etwas länger als breit, an den Seiten hinten schwach ausgeschweift, etwas vor der Mitte am breitesten, ziemlich stark gerundet, oben gleichmässig gewölbt, dicht und grob, gleichmässig punktiert, die Zwischenräume scharf abgesetzt. Flügeldecken kürzer als der Halsschild, quer-rechteckig, gröber als der Halsschild, aber weitläufiger und runzeliger punktiert. Hinterleib walzenförmig, nur an den Seiten des 3., 7. und 8. Tergites gerandet, weniger grob und weniger dicht als der Vorderkörper punktiert, glänzender. Die Punktierung ist ziemlich gleichmässig.

Länge, 4.5 mm.

LUZON, Laguna, Mount Maquiling (1 Exemplar).

Stenus (Hypostenus) maquilinganus sp. nov.

♂ : In die Nähe des *Stenus bispinus* Motsch. zu stellen, fast von der gleichen Färbung, jedoch durch dreimal grössere Gestalt, viel längere Flügeldecken, viel weitläufigere Punktierung des ganzen Körpers, längeren Halsschild u. s. w. auf den ersten Blick zu unterscheiden. Schwarz, mit gedämpftem Glanze, die Fühler mit Ausnahme der schwach gebräunten Keule und die Taster rötlichgelb, die ganzen Beine weisslichgelb. Kopf breiter als der Halsschild, aber schmäler als die Flügeldecken, ziemlich flach mit schwach angedeuteten Stirnfurchen, ober den Fühlerwurzeln und hinten längs der Mitte geglättet, diese Stellen jedoch wenig vortretend, sonst mässig stark und weitläufig punktiert. Fühler lang, die Glieder der Keule gut doppelt so lang als breit. Halsschild viel schmäler als die Flügeldecken, um ein Drittel länger als breit, cylindrisch, in der Mitte nur schwach erweitert, oben an den Seiten schwach schräg eingedrückt, mässig stark und mässig dicht punktiert. Flügeldecken länger als der Halsschild, ziemlich quadratisch, gröber als dieser und nur wenig dicht, hinten feiner und weitläufiger punktiert. Hinterleib nur in den Basalfurchen der vorderen Tergite stark und dicht punktiert, sonst nahezu glatt, nur mit äusserst zarten Pünktchen vereinzelt besetzt.

Länge, 5.25 mm.

LUZON, Laguna, Mount Maquiling (1 Exemplar).

Beim ♂ ist das 6. Sternit sehr breit und sehr tief dreieckig ausgeschnitten, der Ausschnitt fast bis zur Basis reichend, das 5. Sternit ist der ganzen Länge nach dreieckig dicht goldgelb behaart, die vorhergehenden bis zum ersten mehr oder weniger der Länge nach eingedrückt, die Eindrücke dicht behaart, der Hinterrand des 4. und 3. Sternites schwach bogig ausgerandet.

Astenus viperinus sp. nov.

Von der Färbung des *Astenus filiformis* Latr. durch die eigentümliche Gestalt des langgestreckten Kopfes sehr ausgezeichnet.

Schwarz, matt, der Hinterleib glänzend, der Hinterrand der Flügeldecken breit gelb gesäumt, die gelbe Farbe neben der Naht nach vorn verlängert, die Fühler und Taster rötlichgelb, die Beine hellgelb. Kopf etwas schmäler als der Halsschild, fast um die Hälfte länger als breit, hinter den Augen vollständig geradlinig verengt, so dass die hintere Hälfte des Kopfes die Gestalt eines verkehrten Trapezes erhält, die Hinterecken verhaltnismässig schmal verrundet. Die Punktierung ähnlich wie bei *Astenus filiformis*. Halsschild etwas schmäler als die Flügeldecken, fast um die Hälfte breiter als lang, eiförmig, ähnlich wie bei *A. filiformis* punktiert. Flügeldecken etwas länger als der Halsschild, weniger dicht als bei *A. filiformis* punktiert, mit stärkerem Glanze. Hinterleib ziemlich kräftig und mässig dicht, weitläufiger als bei *A. cribrellus* Baudi punktiert, stark glänzend.

Länge, 4.5 mm.

LUZON, Laguna, Los Baños.

Beim ♂ ist das 6. Sternit schmal und tief ausgeschnitten, der Ausschnitt an den Rändern schmal geglättet, das 5. ist der ganzen Länge nach breit niedergedrückt, am Hinterrand breit und seicht ausgerandet und dicht krenuliert, das 4. ist ebenfalls, aber in geringerer Ausdehnung niedergedrückt und vor der Mitte des Hinterrandes breit geglättet.

Astenus philippinus sp. nov.

Von der vorhergehenden Art durch etwas kleinere Gestalt, viel kürzeren Kopf, der aber immer noch länger als bei *Astenus filiformis* ist, kürzeren Halsschild, kürzere Flügeldecken, nicht nach vorn gezogene gelbe Färbung des Hinterrandes derselben und viel kürzere Fühler unterschieden.

Der Kopf ist deutlich länger als breit, die Fühler sind kurz, die vorletzten Glieder kaum länger als breit, das Endglied ziemlich breit, an der Spitze schief abgestutzt. Der Halsschild ist kurz oval, an den Seiten mit 2 Seitenborsten. Die Flügeldecken sind wenig länger als der Halsschild, nicht allzu dicht punktiert, ziemlich glänzend.

Länge, 3.75 mm.

LUZON, Laguna, Los Baños.

Medon philippinus sp. nov.

Diese Art ist dem *Medon granulicollis* Bernh. so nahe verwandt und in der Bildung der einzelnen Körperteile so ähnlich, dass

es genügt die wenigen, aber immerhin markanten Unterscheidungsmerkmale anzugeben. Die Färbung ist im allgemeinen dunkler, pechschwarz, die Flügeldecken an der Basis mehr oder minder rotbraun, der Spitzenrand hell rötlichgelb, mit langen gelben Haaren dicht bekleidet, bei unausgefärbteren Exemplaren tritt die rostbraune Färbung mehr oder minder hervor. Der Kopf ist breiter, nach hinten nicht wie bei *M. granulicollis* Bernh. schwach erweitert, sondern ganz parallelseitig. Die Punktierung des Kopfes und Halsschildes ist viel dichter und runzeliger ineinanderfliessend, während bei *M. granulicollis* die einzelnen Körner von einander deutlich gesondert sind.

Länge, 3.5–4 mm.

LUZON, Laguna, Los Baños.

Beim ♂ ist das schmale 6. Sternit schwach ausgerandet, die übrigen Sternite einfach.

Staphylinus (Nesiolinus) bakeri sp. nov.

Eine durch die prächtige Farbe sehr ausgezeichnete Art.

Schwarz, Kopf, Halsschild und Flügeldecken lebhaft Kornblumenblau, das Endglied der schwarzen Fühler und die Spitze des vorletzten, sowie die Beine weissgelb, die obere Kante der Schenkel bis auf die Spitze pechschwarz, die Stacheln der Schiener schwarz, die Tarsen mit Ausnahme des ersten Tarsengliedes der Mittel- und Hintertarsen rötlichschwarz. Kopf und Halsschild ziemlich glänzend, sehr grob und ziemlich dicht nabelig punktiert, silberweiss behaart, überdies mit längeren dünneren schwarzen Härchen und an den Seiten mit langen schwarzen Borsten besetzt. Die Flügeldecken matt chagriniert und überdies fein und weitläufig punktiert, lang und wenig dicht schwarz behaart, mit einer silberweissen Querbinde vor der Mitte, am Hinterrande dicht mit langen silberweissen Haaren bekleidet. Hinterleib nach rückwärts verengt, ziemlich glänzend, fein und weitläufig punktiert und dünn schwarz behaart und stellenweise, namentlich in der Mitte und an den Seiten, mit ziemlich dichtem silberweissem Toment besetzt. Die Hinterbrust ebenfalls silberweiss behaart. Der Kopf ist um ein gutes Stück schmäler als der Halsschild, um ein Viertel breiter als lang, an den Seiten fast nach rückwärts verengt, die Schläfen hinter den Augen ein Drittel so lang als deren Längsdurchmesser; die Oberseite ist längs der Mitte schmal geglättet. Halsschild etwas schmäler als die Flügeldecken, der Hinterrand und Seitenrand in kontinuirlichen Bogen gerundet, nach vorn deutlich verengt.

Länge, 11 mm.

LUZON, Laguna, Mount Maquiling.

Beim ♂ ist das 6. Sternit breit und ziemlich tief ausgeschnitten, der Ausschnitt im Grunde gerundet, das 5. ist leicht ausgerandet.

Diese Art und die Folgende besitzen eine Anzahl von Merkmalen, die die Aufstellung eines neuen Subgenus notwendig machen, für welches ich den Namen *Nesiolinus* wähle.

Diese Untergattung zeichnet sich unter den Arten mit rudimentären Epimeren durch den nach hinten schwach verengten Kopf und den nach vorn verengten Halsschild aus. Die Fühlerbildung ist der des Subgenus *Trichoderma* gleich. Der Fortsatz der Mittelbrust, der bei den vorliegenden Stücken nicht deutlich sichtbar ist, scheint mir die Mitte zwischen *Trichoderma* und *Abemus* zu halten.

Staphylinus (Nesiolinus) pulcherrimus sp. nov.

♀ : Dem vorhergehenden an Körpergestalt und Punktierung des Vorderkörpers recht ähnlich, jedoch kleiner, ganz anders gefärbt und behaart, überdies durch matten Hinterleib ausgezeichnet.

Schwarz, matt, der Halsschild, eine Schultermakel auf den Flügeldecken und die schmale Hinterleibspitze gelbrot, die 4 ersten und das letzte Glied der schwarzen Fühler und die Brust rötlichgelb, die Hinterbrust etwas angedunkelt, die Beine einfärbig hellgelb. Die rotgelbe Schultermakel setzt sich bis zum Aussenrande der Flügeldecken fort. Die Epipleuren und der hinten mit ihnen verbundene Hinterrand der Flügeldecken sind lichtgelb gefärbt; diese Färbung erweitert sich gegen die Hinterecken. Der gelb gefärbte Hinterrand der Flügeldecken ist mit goldgelben zottigen Haaren dicht bekleidet. Der Hinterleib ist dicht schwarz behaart, die Seiten der Tergite und die Apicalhälfte des 6. Tergites ist dicht licht goldgelb tomentiert.

Länge, 9 mm.

LUZON, Laguna, Mount Maquiling (1 Exemplar).

Coproporus philippinus sp. nov.

Dem *Coproporus brunnicollis* Motsch. (*punctipennis* Kr.) sehr nahe verwandt, ganz von dem Habitus und der Färbung desselben, jedoch halb so klein und durch viel feiner und dichter punktierte Flügeldecken sofort von ihm zu unterscheiden.

Die Flügeldecken sind wie bei *C. brunnicollis* Motsch. an den Seiten flach ausgebreitet und weder eingedrückt noch gefurcht. Der Körper ist hochgewölbt, Kopf und Halsschild spiegelblank.

Länge, fast 2 mm. (bei eingezogenem Hinterleibe).

LUZON, Laguna, Los Baños (1 Exemplar).

Genus **PSEUDOSILUSA** novum

Im Habitus einer *Silusa* recht ähnlich jedoch infolge der Mundbildung in die nächste Nähe von *Phymatura* zu verweisen.

Die Gestalt der Zunge, der Lippen und Kiefertaster, sowie der Kieferladen ist von der letztgenannten Gattung kaum verschieden; die neue Gattung unterscheidet sich aber ausser dem *Silusa*-artigen Habitus sehr markant von *Phymatura* durch ungekielte Mittelbrust. Habituell auch der Gattung *Diestota* Muls. et Rey verwandt, von dieser aber durch den rückwärts zugespitzten Fortsatz der Mittelbrust verschieden. Ob in der Bildung der Zunge auch ein Unterschied zu *Diestota* vorhanden ist kann ich nicht beurteilen, da in der Rey'schen Beschreibung [1] von der Zungenbildung keine Erwähnung geschieht. Bei dem neuen Genus ist die Zunge, wie bei *Bolitochara*, lang und schmal an der Spitze gespalten und bis zur Spitze des 2. Lippentastergliedes reichend. Über die Lebensweise ist bisher nichts bekannt; die vorläufig einzige Art der Gattung wurde von Herrn Prof. Baker auf den Philippinen entdeckt.

Pseudosilusa trifoveolata sp. nov.

Von der zweiten indo-malayischen Art *P. testacea* Kr. durch die Färbung, matteren Körper, dichtere Punktierung u. s. w. sofort zu unterscheiden.

Mattschwarz, die 4 ersten Glieder der dunkeln Fühler und die Taster rötlichgelb, die Beine lichtgelb. Kopf, Halsschild und Flügeldecken äusserst fein und äusserst dicht chagriniert und mässig fein und mässig dicht punktiert. Die Fühler sind ziemlich kurz, gegen die Spitze verdickt, das 3. und 2. Glied fast gleichlang, das 4. stark quer, die vorletzten fast doppelt so breit als lang. Kopf mässig schmäler als der Halsschild mit grossen vorstehenden Augen. Halsschild viel schmäler als die Flügeldecken, um mehr als die Hälfte breiter als lang, oben flachgedrückt, mit 3 Längseindrücken, einem in der Mitte auf der vorderen Hälfte und zwei schief nach rückwärts convergierenden, gegen das Schildchen gerichteten, hinten miteinander verbundenen Furchen. Hinterleib gleichbreit, ziemlich fein und wenig dicht gleichmässig punktiert, glänzend.

Länge, 2 mm.

LUZON, Laguna, Los Baños.

Beim ♂ ist das 8. Tergit am gerundeten Hinterrand verdickt und besitzt zu beiden Seiten desselben je ein komma-artiges Höckerchen.

[1] Hist. Nat. Col. Brevip. (1871), 97.

Astilbus philippinus sp. nov.

Einer grossen *Falagria* nicht unähnlich, ungefähr vom Habitus des *Astilbus heydeni* Epp.

Schwarz, glänzend, der Vorderkörper mit schwachem Erzglanz, die Fühler und Taster rostrot, die 3 ersten freiliegenden Tergite mit weissgelber Basis der aufgebogenen Seitenränder, die Beine weiss, die ganzen Vorderschenkel und die Spitzenhälfte der übrigen Schenkel schwärzlich, die Tarsen rötlichgelb. Kopf etwas breiter als der Halsschild, quer rechteckig mit abgerundeten Winkeln, glänzend glatt, unpunktiert mit ziemlich grossen Augen, die Schläfen kaum länger als deren halber Durchmesser. Fühler lang und kräftig, gegen die Spitze kaum verdickt, das 3. Glied doppelt so lang als das 2., die folgenden oblong, allmählich kürzer werdend, die vorletzten nicht quer, das letzte kürzer als die 2 vorhergehenden zusammengenommen. Halsschild hinten halb so breit als die Flügeldecken am Hinterrande, wenig breiter als lang, herzförmig, vorn am breitesten, nach rückwärts ausgeschweift verengt, in der Mitte scharf gefurcht, ziemlich gewölbt, glänzend, fein und mässig dicht punktiert. Flügeldecken zusammen stark quer, gelbbräunlich, an den Schultern breit gelb, ziemlich kräftig und dicht punktiert, glänzend. Abdomen glänzend glatt, fast unpunktiert.

Länge, 3 mm.

LUZON, Laguna, Los Baños.

Unausgefärbtes Stück mit ausgedehnter gelblichbrauner Färbung der einzelnen Körperteile.

Zyras biseriatus sp. nov.

Eine ziemlich gleichbreite Art, die durch die Dorsalreihen am Halsschild sehr ausgezeichnet ist. Rötlichgelb, stark glänzend, der Hinterleib vor der Spitze etwas dunkler.

Kopf um ein Drittel schmäler als der Halsschild, ziemlich kräftig und mässig dicht punktiert, in der Mitte geglättet, daselbst weitläufig an den Seiten im Grunde dicht chagriniert. Augen mässig gross, die Schälfen hinter denselben ungefähr so lang als der Augendurchmesser, unten gegen den Hals zu kurz gerandet. Fühler mässig kurz, seitlich stark zusammengedrückt, das 3. Glied doppelt so lang als das 2., das 4. bei breitester Ansicht schwach, die folgenden allmählich stärker quer, die vorletzten stark quer, doppelt so breit als lang, das Endglied so lang als die 2 vorhergehenden zusammen. Halsschild so breit als die Flügeldecken, um die Hälfte breiter als lang, flach gewölbt, an den Seiten gleichmässig gerundet, längs der Mittelpartie unpunktiert, zu beiden Seiten derselben mit

einem leicht vertieften, vorn und rückwärts verkürzten Längseindruck, welcher ziemlich kräftig und sehr dicht punktiert ist, neben diesen Eindrücken wieder unpunktiert, an den Seiten wieder ziemlich kräftig und wenig dicht punktiert, im Grunde glänzend glatt. Flügeldecken kürzer als der Halsschild, kräftig und wenig dicht punktiert, im Grunde deutlich chagriniert. Abdomen gleichbreit, glänzend, auf den vorderen Tergiten nur mit den Querreihen borstentragender Punkte, hinten äusserst fein chagriniert und spärlich gekörnt, am 1. Tergit dichter körnig punktiert.

Länge, 5–5.5 mm.

LUZON, Laguna, Mount Maquiling.

Von *Zyras compressicornis* Fauv., der ebenfalls Dorsalreihen am Halsschild besitzt, schon durch viel kleinere Gestalt und viel feinere Punktierung des ganzen Körpers verschieden.

Zyras pulchricornis sp. nov.

♀ : In die Nähe des *Zyras fulgidus* Grav. zu stellen, fast vom gleichen Habitus, durch die Färbung und insbesondere die Bildung und Farbe der Fühler sehr ausgezeichnet.

Leuchtend gelbrot, sehr stark spiegelglänzend, die Flügeldecken mehr gelb, ihre Hinterecken schwärzlich, die Basis des 6. und die Spitze des 7. Tergites schwach quer angedunkelt, die Beine hellgelb, die Fühler tiefschwarz, die 3 ersten Glieder und das Endglied rötlichgelb. Kopf etwas schmäler als der Halsschild, quer trapezförmig, mit einzelnen mässig feinen Punkten besetzt, die Schläfen hinter den Augen fast so lang als deren Längsdurchmesser, rückwarts auf der Unterseite gerandet. Die Fühler lang und schlank, gegen die Spitze kaum verdickt, das 3. Glied ein wenig länger als das 2., die folgenden oblong, allmählich an Länge abnehmend, die vorletzten schwach quer, das Endglied schmal, langgestreckt, fast gleichbreit, an der Spitze abgerundet, fast länger als die 3 vorhergehenden zusammengenommen. Halsschild viel schmäler als die Flügeldecken, um ein Drittel breiter als lang, an den Seiten schwach gerundet, im ersten Drittel am breitesten, vor dem Schildchen mit einer tiefen scharf eingegrabenen Grube, zu beiden Seiten der unpunktierten Mittelzone mit je einer feinen Punktreihe, an den Seiten spärlich und unregelmässig punktiert. Flügeldecken wenig länger als der Halsschild, ziemlich kräftig, mässig dicht punktiert, innerhalb den Hinterecken nicht ausgerandet. Abdomen spiegelblank, fast unpunktiert.

Länge, 4 mm.

LUZON, Laguna, Mount Maquiling (1 Exemplar).

Hoplandria minima sp. nov.

Noch kleiner als die zweite von den Philippinen bekannte Art *H. philippina* Brh., von derselben ausserdem in nachfolgenden Punkten verschieden.

Kopf und Halsschild sind fast ganz unpunktiert, spiegelblank, letzterer kürzer, namentlich aber im Verhältnis zu den Flügeldecken schmäler, diese sind viel stärker und wohl viermals weitläufiger punktiert als bei *H. philippina*. Auch der Hinterleib ist ausser den Querreihen von Borstenpunkten auf den einzelnen Tergiten unpunktiert, spiegelglänzend. Der Halsschild ist deutlich schmäler als die Flügeldecken und viel gewölbter als bei *H. philippina*.

Länge, $1\frac{2}{3}$ mm.

LUZON, Laguna, Los Baños.

Ich stelle diese Art mit Bedenken zu *Hoplandria*, kann meine Zweifel jedoch vorläufig nicht lösen, weil ich das einzige mir gehörige Exemplar nicht opfern kann.

Genus **GASTROPAGA** novum

Die neue Gattung gehört in die Tribus *Myrmedoniini* und hat hier eigentlich keine nähere Verwandtschaft.

Ungefähr vom Habitus und der Behaarung einer *Brachida*, jedoch mit gleich breitem Hinterleib, zeigt die neue Gattung verschiedene Merkmale, insbesondere die Zungenbildung und die Bildung der inneren Maxillarlade, die ihr in der Tribus eine isolierte Stellung geben. Gleichbreit, stark gewölbt, ziemlich dicht grau behaart, die Seiten des Hinterleibes sehr dicht mit schwärzlichen langen Haaren gleich einem Barte besetzt.

Der Kopf viel schmäler als der Halsschild, nicht eingeschnürt, mit ziemlich grossen Augen und scharf und vollständig gerandeten Schläfen. Die Fühler mässig kurz, gegen die Spitze verdickt, ihr 3. Glied wenig kürzer als das 2., das 4. ziemlich stark quer, die folgenden allmählich breiter werdend, die vorletzten doppelt so breit als lang, das Endglied konisch verengt, länger als die 2 vorhergehenden zusammen genommen. Die Oberlippe stark quer, vorn abgestutzt mit breit abgerundeten Vorderecken. Die Mandibeln kurz, die eine mit einem scharfen Zähnchen knapp vor der Mitte, am Innenrande mit einem ziemlich dicht bewimperten Hautsaume, an der Basis mit je 2 dicht neben einander stehenden Querreihen dichter kurzer Zähnchen. Die Maxillarladen ziemlich gestreckt, die Innenlade gegen die Spitze hornig, diese selbst hakig gekrümmt, hinter derselben mit einer Anzahl kurzer, starrer, ziemlich weitläufig stehender Zähne und hinter

denselhen mit einer Anzahl langer, gekrümmter, ziemlich dicht stehender Stacheln bewehrt, daselbst auch lang behaart, die basale Hälfte des Innenrandes ist häutig. Die Aussenlade mässig schmal, hornig, an der häutigen Spitze dicht mit langen fiederförmigen Haaren und innen an der Spitze noch mit Haarborsten besetzt. Die Kiefertaster viergliedrig, schlank, das 3. Glied mässig angeschwollen, das Endglied pfriemenförmig, weniger als halb so lang als das 2. Das Kinn quer trapezförmig, an der Spitze gerade abgestutzt. Die Zunge sehr schmal und langgestreckt, bis über die Spitze des 2. Lippentastergliedes nach vorn reichend, an der Spitze schmal und tief gespalten, der Zunge der Gattung *Bolitochara* recht ähnlich. Die Lippentaster ziemlich kräftig, das 1. Glied sehr dick, kaum so lang als an der Basis breit, das 2. kaum kürzer, aber doppelt schmäler als das 1., das Endglied viel schmäler und kürzer als das 2. Glied.

Der Halsschild ist sehr kurz und breit, mehr als doppelt so breit als lang. Die Flügeldecken sind am Hinterrande vor den Hinterecken scharf ausgerandet. Der Hinterleib an der Basis der 3 ersten freiliegenden Tergite quer eingedrückt.

Fortsatz der Mittelbrust zugespitzt, fast bis zum Hinterrande der Mittelhüften reichend, diese ziemlich breit getrennt. An den viergliedrigen Vordertarsen die 3 ersten Glieder ziemlich gleichgebildet, das letzte fast so lang als die übrigen zusammen, an den fünfgliedrigen Mitteltarsen die 4 ersten Glieder fast gleich, das Endglied etwas kürzer als die 3 vorhergehenden zusammen. Die fünfgliedrigen Hintertarsen gestreckt, das 1. Glied viel länger als das 2., das Endglied etwas länger als 3 und 4 zusammen.

Die neue Gattung ist bisher nur durch die folgende philippinische Art vertreten.

Gastropaga bakeri sp. nov.

Pechbraun bis schwärzlich, ziemlich glänzend, die Seiten des Halsschildes heller durchscheinend, die Wurzel und das Endglied der Fühler, die Taster und Beine rötlichgelb. Kopf weitläufig und sehr undeutlich punktiert, glänzend. Halsschild fast so breit als die Flügeldecken, an den Seiten gerundet, nach vorn stärker verengt als nach rückwärts, kurz vor den abgerundeten Hinterecken am breitesten, gleichmässig gewölbt, ohne Eindrükke, etwas deutlicher und weniger weitläufig punktiert als der Kopf. Flügeldecken deutlich länger als der Halsschild, ziemlich kräftig deutlich rauh und mässig dicht, der Hinterleib mässig fein und ziemlich gleichmässig wenig dicht punktiert.

Länge, 2–2.5 mm.

LUZON, Laguna, Los Baños.

Aleochara flavipennis sp. nov.

Ganz vom Habitus der *Aleochara curtula* Goeze und derselben äusserst nahe verwandt, von ihr jedoch ausser der markanten Färbung noch durch viel gröbere und dabei weitläufigere Punktierung des Kopfes und Halsschildes, sowie durch weitläufigere Punktierung der Flügeldecken sofort zu trennen.

Die Farbe ist schwarz, die Flügeldecken und die Spitze des Hinterleibes vom Hinterrand des 7. Tergites angefangen hellgelb, die Seiten des Halsschildes namentlich vorn mehr oder minder rötlich durchscheinend.

Länge, $4\frac{1}{3}$–5.5 mm.

LUZON, Laguna, Mount Maquiling.

DRYOPIDÆ ET HETEROCERIDÆ DES PHILIPPINES

Par A. Grouvelle
(*Paris, France*)

Sostea atramentaria sp. nov.

Suboblonga, apice elytrorum acuminata, convexa, nitidula, atra, antennis pedibusque plus minusve fusco-piceis vel rufo-piceis. Caput fronte subdepressum, haud dense profundeque punctatum, pilis flavo-cinereis, minimis, tenuibus et stratis dense vestitum, aliquibus pilis fuscis, erectis, elongatis intermixtis. Prothorax antice angustatus; lateribus antice modice arcuatis, postice subrectis, antrorsum convergentibus; pronoto in longitudinem regulariter convexo, subparce et haud valde punctato; punctis in angulos posticos sparsioribus; pubescentia illi capitis simili sed pilis erectis longioribus et densioribus. Elytra humeris rotundata, quam prothorax vix altiora, lateribus subparallela, ad apicem attenuata et conjunctim acuminata, 2.5 longiora quam simul latiora, pilis minimis cinereis plus minus erectis et pilis fuscis, elongatis, erectis, ornata, punctato-striata; punctis et striis ad latera paulatim majoribus; stria suturali lapicem versus manifesta, in disco nulla; striarum intervallis ad apicem vix elevatis, marginem apicalem attingentibus; disco in longitudinem quam prothorax valdus convexo.

Long., 3.7 mm.

Luzon, Laguna, Los Baños (1 Exemplaire, *coll. A. Grouvelle; C. F. Baker*).

Suboblong, environ trois fois plus long que large, très convexe, assez brillant, noir; antennes et pattes roux de noix plus ou moins foncé. Tête subdéprimée sur le front, éparsément et peu profondément ponctuée, couverte d'une pubescence formée de poils flaves-cendrés, assez fins, serrés, masquant presque le tégument, entremêlés de poils sombres, dressés et allongés; pubescence de l'épistome plus serrée, plus claire, en partie plus allongée et plus redressée; yeux séparés par un intervalle un peu plus grand que deux fois et demie leur diamètre transversal. Prothorax retréci en avant, faiblement arqué sur les côtés, un peu plus de deux fois plus large à la base que long, largement et peu profondément

échancré au bord antérieur; angles antérieurs aigus, un peu saillants en avant, côtés rebordés par un bourrelet un peu accentué; angles postérieurs aigus, faiblement saillants en arrière; base trisinuée comme chez tous les *Sostea*. Disque longitudinalement et régulièrement convexe; présentant, vers le deuxième tiers de la longueur à partir de la base, un pli transversal, faiblement marqué; convexité du disque déterminant des marges latérales concaves, à peine marquées sur la région des angles postérieurs, s'élargissant vers la base et se dilatant sur la région des angles postérieurs. Ponctuation plus ou moins espécée, fine sur le disque, beaucoup plus grosse sur la région des angles et surtout sur celle des angles antérieurs. Pubescence semblable à celle de la tête, rare sur le disque, assez dense sur les angles postérieurs, entremêlée de longs poils sombres, dressés. Ecusson faiblement transversal, subtriangulaire. Elytres arrondis aux épaules, à peine plus larges que le prothorax à la base, à peine élargis, presque subparallèles, atténués arqués vers le sommet à partir du dernier tiers de la longueur, acuminés ensemble à l'extrémité, environ deux fois et demie plus longs que larges ensemble, longitudinalement et régulièrement convexes, présentant vers le premier tiers de la longueur le point le plus élevé de leur convexité, assez brusquement infléchis à leur extrémité. Ponctuation formant des lignes ponctuées fines sur le disque, puis des lignes ponctuées-striées devenant progressivement plus fortes vers les bords latéraux; lignes suturales et premières dorsales plus fortes, striées vers l'extrémité; toute les autres striées-ponctuées, brièvement plus accentuées à la base, atténuées vers le sommet; strie suturale et 1re, 2e, 3e et 4e stries discoidales de chaque élytre atteignant le bourrelet apical; 5e et 6e stries écourtées à l'extrémité; calus huméraux marqués; stries suturales terminées par un gros point enfoncé. Bords latérals vus de face assez brièvement sinués contre l'extrémité de l'élytre. Pubescence formée de poils sombres, dressés et de petits poils cendrés, rares, plus abondants sur les côtés et vers le sommet. Pubescence du dessous du corps dense, cendrée, un peu flave.

Voisin de *S. sodalis* Pasc.; distinct par sa pubescence cendrée, plus abondante et par l'absence de stries sur le disque des élytres.

Sostea ebenina sp. nov.

Sublonga, apice elytrorum acuminata, convexa, nitidula, atra, antennis pedibusque fusca, tarsis rufa. Caput fronte convexiusculum, pilis floro-cinereis, elongatis, stratis, dense vestitum, occipite subdense valdeque punctatum; punctis apicem versus

minoribus et paulo sparsioribus. Prothorax antice angustatus; lateribus antice arcuatis, postice subrectis et subparallelis; pronoto ultra apicem transversim convexo-elevato, subparce profundeque punctato, punctis in disco minoribus et sparsioribus; pubescentia illi capitis simili, sed pilis fuscis, elongatis, erectis, intermixta. Elytra humeris rotundata, tunc quam prothorax latiora, lateribus subsinuata et subparallela, dein apicem versus attenuata et conjunctim subspinoso-acuminata, 3.5 longiora quam simul latiora, punctato-striata; striis et punctis ad latera paulatim majoribus; stria suturali praecipue in medio laevi; disco in longitudinem quam pronoto validius convexo. Elytra pilis fuscis, elongatis, erectis et praecipue apicem versus pilis cinereis plus minusve stratis ornata.

Long. 3–3.7 mm.

NEGROS (plusieurs exemplaires, *coll. A. Grouvelle*).

Oblong, environ trois fois plus long que large, très convexe, assez brillant, noir; antennes et pattes plus ou moins enfumées, tarses rougeâtres. Tête convexe, fortement et assez densément ponctuée sur l'occiput, plus éparsément et moins fortement ponctuée vers la partie antérieure, couverte d'une pubescence formée de poils couchés, longs, assez serrés, jaunes cendrés, plus fins sur le front, plus épais et presque très serrés sur le devant de la tête et sur l'épistome; entremêlés de quelques points médiocrement longs; yeux séparés par un intervalle subégal à deux fois et demie leur diamètre transversal. Prothorax rétréci en avant, arqué sur les côtés, principalement en avant, subparallèle contre la base, un peu plus de deux fois plus large à la base que long, subtronqué au milieu du bord antérieur et fortement sinué de chaque côté devant les yeux; angles antérieurs obtus; côtés rebordés en bourrelet; angles postérieurs aigus, un peu saillants en arrière; base trisinuée comme chez tous les *Sostea*. Disque longitudinalement convexe surtout en avant, présentant vers le deuxième tiers de la longueur un pli transversal, infléchi en avant; convexité du disque déterminant des marges latérales concaves, très abaissées en avant, un peu étroites devant le pli transversal, à peine élargies en avant, devenant progressivement très larges, sur les angles postérieurs. Ponctuation profonde, un peu écartée sur le disque, plus forte et plus serrée sur le reste de la surface. Pubescence semblable à celle de la tête, plus rare sur le disque, entremêlée de longs poils sombres dressés. Ecusson faiblement transversal, émoussé au sommet faiblement pubescent. Elytres arrondis aux épaules, alors un peu plus

larges que le prothorax à la base, subparallèles sur les côtés et subsinués vers le premier tiers de la longueur, atténués arrondis vers le sommet à partir du dernier tiers de la longueur, terminés ensemble en pointe aigüe, environ deux fois et demie plus longs que larges ensemble, longitudinalement convexes, présentant vers le premier tiers de la longueur le point le plus élevé de leur convexité. Ponctuation disposée en lignes striées, ponctuées, peu marquées pour les deux premières près de la suture, devenant ensuite progressivement plus fortes vers les bords latéraux; sur chaque élytre 1er et 2e intervalle à partir de la strie suturale brièvement et faiblement relevés à la base; strie suturale fortement enfoncée dans la partie apicale, 1re strie discoïdale et suivante atténuées vers le sommet; 4e, 5e, 6e et 7e intervalle soudés près de la bordure latérale; celle-ci étroite sur les côtés à la base, un peu élargie au sommet; calus huméraux marqués. Pubescence comprenant des longs poils sombres dressés, peu serrés, des poils cendrés beaucoup plus courts, rares, localisés sur la partie apicale des élytres et des poils semblables à ceux de la tête bordant très étroitement les bords latéraux. Dessous du corps noir, étroitement bordé de rougeâtre sur les marges latérales des sternites.

Voisin de *S. sodalis* Pasc.; mais pubescence plus abondante, forme plus étroite, intervalles des stries plus étroits, marge lisse de la base des élytres plus étroite. Plus voisin de *S. atramentaria* Grouv. mais moins densément pubescent et plus fortement strié sur les élytres. Peut-être une race locale de cette espèce.

Heterocerus latus sp. nov.

Oblongus, paulo magis 2.5 longior quam latior, convexus, nitidulus, crebre punctulatus, nigro-brunneus; prothoracis elytrorumque marginibus lateralibus et in elytris aliquibus maculis linearibus fulvo-rufis; antennarum basi testacea. Caput transversissimun, fronte convexiusculum, antice truncatum pube fusco et fusco-cinerea, brevissima demissime vestitum; margine antico tenuiter cinereo-ciliato; labro modice transverso, antice rotundato. Prothorax transversissimus, antice valde angustatus, postice subparallelus, crebre punctulatus, dense tenuiterque fusco-pubescens, pilis longioribus, erectis, praecipue in marginibus anticis lateralibusque intermixtis; margine antico subtruncato, breve cinereo-ciliato; angulis anticis obtusis, lateribus arcuatis; angulis posticis sat late obtusis; basi tenuiter marginata. Elytra humeris rotundata, apice conjunctim breviter ro-

tundata, circiter 1.5 longiora quam simul latiora, crebre punctulata, fusco-cinereo pruinosa; maculis fulvo-rufis linearibus, in longitudinem ordinatis, parum manifestis, in partem apicalem elytrorum dispositis. Corpus subtus in maxima parte infuscatum; pedibus sordido-testaceis.

Long., 3 mm.

LUZON, Laguna, Los Baños (2 exemplaires, *coll A. Grouvelle; C. F. Baker*).

Oblong, plus de deux fois plus long que large, convexe, un peu brillant, très densément pointillé, varié de roux sur les marges latérales du prothorax et des élytres et sur la moitié apicale de ces derniers. Antennes de 10 articles. Tête moins de deux fois plus large avec les yeux que longue avec les mandibules, modérément convexe sur le front, couverte d'une pubescence sombre en partie légèrement cendrée, presque feutrée; bord antérieur tronqué, cilié de petits poils cendrés; côtés modérément sinués en avant des yeux, ceux-ci peu saillants, à très petites facettes; labre plus de deux fois plus large à la base que long, atténué vers l'avant, arrondi au bord antérieur. Prothorax fortement rétréci en avant, subparallèle à la base, environ deux fois et demie plus large à la base que long, couvert d'une pubescence sombre, fine et serrée, entremêlée surtout au bord antérieur de poils plus longs dressés; bord antérieur légèrement arrondi en avant dans le milieu, largement subtronqué vers les extrémités, ciliés de courtes soies cendrées, brièvement rebordé en bourrelet aux extrémités; angles antérieurs obtus, un peu moins obtus lorsqu'ils sont vus de face; bords latéraux arqués, bordés par une marge d'un roux un peu sombre, dilatée sur la région des angles antérieurs; angles postérieurs obtus; base arquée, finement rebordée sur toute la longueur; troncature des angles postérieurs de la couleur de la marge latérale, bordée en dessus par la strie marginale de la base. Ecusson oblong, noirâtre. Elytres arrondis aux épaules, subparallèles brièvement arrondis au sommet, environ une fois et demie plus longs que larges ensemble, couverts d'une pruinosité brun cendré; base légèrement sinuée, rebordée de chaque côté de l'écusson par une très étroite marge roux un peu sombre, n'atteignant pas le calus huméral; bords latéraux étroitement rebordés, présentant une marge d'un roux sombre, brièvement élargie vers le premier tiers de la longueur, s'atténuant et s'effaçant vers le sommet; sur la moitié apicale du disque, quelques vestiges de taches longitudinales linéaires, toujours d'un roux sombre, semblant

distribuées sur deux bandes formant chacune un angle très obtus, orienté vers le sommet de l'élytre; calus huméraux assez longuement marqués: ponctuation plus forte que celle du prothorax présentant, lorsque l'insecte est vu de côté, des vestiges de sillons longitudinaux. Dessous du corps noirâtre, marges latérales du prosternum et des segments abdominaux, extrémités de l'abdomen, milieu du prosternum et pattes roux un peu enfumé. Stries marginales des hanches intermédiaires très fortement arquées. Partie externe de la bordure des plaques fémorales des hanches postérieures large, peu saillante, longuement striolée sur la partie basilaire.

NOTICES OF CERTAIN PHILIPPINE FULGOROIDEA, ONE BEING OF ECONOMIC IMPORTANCE

By C. F. Baker

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TWO PLATES AND 1 TEXT FIGURE

Melichar [1] describes a new fulgorid genus, *Egropa,* with one species, *inusta,* which he refers to the Tettigometridæ ("Tettigometrini"). His figures give the body outlines and a front and lateral view of the face. His species, from the description, must have been a very beautiful object, but unfortunately he possessed only a single specimen. Distant [2] inserts *Egropa* as an unplaced genus following the Issidæ. He quotes Melichar's descriptions and copies his figures, remarking that he had never seen the species. Considering the vast extent of the oriental material studied by Distant, one might infer that this species is a great rarity. However, it will doubtless be secured in great numbers when its food-plant is discovered. In 1907 Bierman [3] described a second species of this interesting genus, as living on *Cassia fistula* in Java. In the same year he figured both nymphs and imagoes of this species with the name of *Egropa jacobsoni.*[4]

It may be commonly noticed in these Islands that many of the large and much-prized fruits of the guanabana (*Anona muricata*) are deformed, are not plump and full all around, but bent and depressed on one side and commonly stunted in growth. Nymphs and imagoes of a species of *Gargara* (Membracidæ) were to be found occasionally on this tree, and the *Gargara* was suspected of being the cause of this common damage. Only now, after being here three years, do I discover it to be due to a beautiful species of *Hilda* (=*Egropa*), which evanescently breeds in great numbers on the surface of the very young fruits. It lays very numerous eggs in patches on the surface of the fruit and on surrounding leaves. This year it happens that large numbers of these eggs are parasitized by a minute chalcid,[5] so that it is

[1] Homopteren Fauna von Ceylon (1903), 82, Taf. III, fig. 13, a.

[2] Fauna Brit. Ind. Rhynch. (1906), 3, 268.

[3] *Ent. Bericht.* (1907), 2, 162.

[4] *Notes Leyden Mus.* (1907), 29, 158, Taf. III, fig. 6.

[5] Being described under the name *Pseudobrachysticha semiaurea* Girault gen. et. spec. nov.

possible that the coming year will see less injury from this cause in this locality. I have also taken a single specimen on *Anona reticulata*. All of the cultivated anonaceous fruits in the Philippine Islands were imported from America; therefore it is probable that this insect finds its natural food among native anonaceous fruits of the Philippine forests.[6]

[6] After this paper, describing an apparently new species of *Egropa*, had gone to the printer, I made what is, to me, an exceedingly important and interesting discovery: that Distant, although he did not recognize the identity of Melichar's *Egropa* [Fauna Brit. India—Rhynch. (1906), 3, 368], has since described entirely congeneric species in the genus *Hilda* (= *Isthmia* Stål, præocc.). Kirkaldy and Distant had considered this one of the Issidæ, though Stål had associated it with *Tettigometra*. Melichar properly placed it—as *Egropa*—in the Tettigometridæ. Thus set on the right track, I soon discovered that my supposedly new species of *Egropa* was identical with *Isthmia breviceps* Stål, a species apparently not recognized since its description in 1870. I have a second Philippine species from Palawan, as yet unstudied. The generic synonymy and bibliography of this economically important group is as follows:

Genus **Hilda** Kirkaldy

Isthmia Walker—nom. præocc.—List Hom. (1851), **3**, 732; STÅL, Hem. Afr. (1866), **4**, 218.
Hilda Kirkaldy, Entomologist (1900), 243.
Egropa Melichar, Hom. Ceylon (1903), 82; DISTANT, Fauna Brit. Ind.—Rhynch. (1906), **3**, 368.

Hilda undata Walker.
Isthmia WALKER, List. Hom. (1851), **3**, 732. Sierra Leone.

Hilda funesta Stål.
Tettigometra Stål, Of. Vet. Ak. Forh. (1854), 249; WALKER, List Hom. Suppl. (1858), 336; STÅL, Of. Vet. Ak. Forh. (1862), 494.
Isthmia Stål, Hem. Afr. (1866), **4**, 219. Sierra Leone.

Hilda patruelis Stål.
Tettigometra STÅL, Of. Vet. Ak. Forh. (1855), 100.
Isthmia STÅL, Hem. Afr. (1866), **4**, 219. Caffraria.

Hilda breviceps Stål.
Isthmia STÅL, Of. Vet. Ak. Forh. (1870), 761. Philippines (Luzon).

Hilda inusta Mel.
Egropa MELICHAR, Hom. Ceylon (1903), 82. Ceylon.

Hilda jacobsoni Bierm.
Egropa BIERMAN, Ent. Ber. (1907), **2**, No. 34, 162, Java; BIERMAN, Notes Leyden Mus. (1907), **29**, 158.

Hilda malayensis Dist.
DISTANT, Rec. Ind. Mus. (1908), **2**, 129. Siam, Malay States, Bukit Besar.

Hilda bengalensis Dist.
DISTANT, Ann. Mag. Nat. Hist. (1909), **3**, 41. Bengal.

Hilda breviceps Stål.

Color.—Upper part of face and narrow margin of vertex black; remainder of head stramineous; below stramineous; femora apically, tibiæ and tarsi, darker; sides of venter pale green. Pronotum green, becoming brownish posteriorly, the submargin narrowly black, the margin white, and the anterior margin may also be more or less narrowly whitish. Scutellum green, narrowly black-margined posteriorly. Tegmina clear brown, with 4 paler areas, the darker areas blackish edged near costa, the blackish edges in every case flanked by small, elongate, shining white calloused stripes; a white calloused stripe in the clavus, another between this and the base of the tegmina on claval suture, and a third along the anal margin. Distad of the white stripe on disk of clavus is a commissural green spot; a minute white dash occurs on the inner apical margin (Plate I, fig. 1). In the male all of the greens and browns are darkened, becoming almost black, bringing the white markings out in strong relief. All below, and sometimes portions above, more or less covered with a pulverulent white wax.

General proportions of body as in *Hilda inusta* Mel. Width of the vertex (Plate I, fig. 2) somewhat more than twice the length, the fore margin broadly and evenly rounded, and the surface minutely rugulose. Width of pronotum slightly more than three and one half times the length, the hind margin nearly straight, the surface, as also that of scutellum, with sparse and very minute setigerous punctures. Scutellum one half longer than vertex and pronotum together. Upper margin of head, as seen from side (Plate I, fig. 3), irregularly curved. Face deeply concave above the central umbo. Ocellus touching eye. Last antennal joint of great size, the length two and one half times the width, tapering to the tip, which reaches the upper margin of the eyes. Form of face shown in Plate I, fig. 4; female genitalia in Plate I, fig. 6; male genitalia in Plate I, fig. 5. Wing venation as in text fig. 1. Tegmina very brittle coriaceous, venation indistinct, the general surface convex, but sharply and deeply grooved along the claval suture. Length of female, 5 millimeters, of male, 4.25.

Egg.—The egg (Plate I, fig. 10) is deposited in masses of from 10 to 100 or more, neatly arranged side by side in adjoining rows on the surface of a fruit or leaf. They measure 0.3 by 0.65 millimeter, and are pale yellow, the surface covered with sharply raised reticulations. The micropylar end is provided with a short stalk, capped by a pure white knob.

Nymph.—The nearly full-grown nymph is a most extraordinary object, reminding one strongly of certain membracid nymphs. The pronotum possesses 3 fingerlike projections, the middle one of which is much the largest. The mesonotum possesses one similar median projection. The abdominal segments at sides are extended into huge acute projections as shown in Plate I, fig. 7. The face of the nymph (Plate I, fig. 8) should be compared with that of the adult. The antennæ and vertex, especially, differ very strikingly from those of the adult. Plate I, fig. 9, is a view of the head and thorax of the nymph from in front, looking in the direction of the longitudinal axis of the body.

LUZON, Laguna, Mount Maquiling (*coll. Baker*).

Living in extensive colonies on the young fruits of the guanabana (*Anona muricata*).

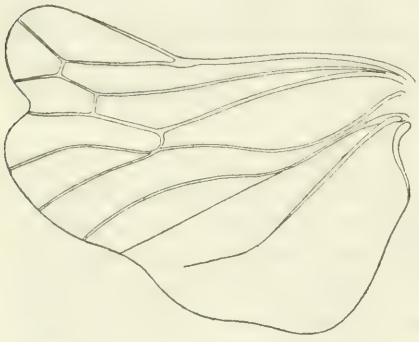

FIG. 1. Wing of *Hilda breviceps* Stål.

This species is very close to *Hilda jacobsoni* Bierman, but is distinct in form of frontal umbo and other structural details, as well as in outlines of nearly all parts of the color pattern of tegmina.

In 1870 Stål [7] described the new genus and species *Augila sulciceps*, remarking, "Genus singulare, maxime insigne, optime, ut puto, prope Calliscelem locandum." This remained a monotypic genus until 1906, when Distant [8] added a second species, *A. binghami*. In his monograph of the Issidæ, Melichar placed this genus in the Caliscelinæ ("Caliscelidæ"), and it is the first species to be treated in the monograph. The chief reason for so placing it must have been Stål's suggestion, for, by Melichar's definition, *Augila* could not possibly be placed in that subfamily. Melichar introduces a difficulty into the study of the genus, in that his figure of the species, supposedly made from the type (since he quotes "Stalsche Type im Museum in Stockholm" after the description), differs widely from Stål's original figure,[9] leaving one to wonder which figure is correct. In Stål's figure the width of pronotum is about four times the length, while in Melichar's it is about two and three fourths

[7] Hemp. Ins. Philipp. (1870), 754.

[8] Fauna Brit. Ind.—Rhynch. (1906), 3, 335.

[9] Op. cit., Pl. IX.

times. The proportions of scutellum are likewise entirely different in the two figures, and the venation of tegmina beyond the nodal vein is even specifically different. I have encountered 3 distinct species of this remarkable genus in the Philippines, none of which even nearly corresponds to the descriptions and figures of *A. sulciceps*, as given by either Stål or Melichar. Evidently the type of *A. sulciceps* needs to be restudied and refigured. If Distant's figure is correct (he gives almost no structural characters in the specific description), then his species is very distinct from anything yet found in the Philippines.

In Luzon I have also discovered a fulgorid with the general habitus and some of the essential characters of *Augila*, and evidently closely related to it, though differing widely in a number of respects. Melichar has made this the type of a new genus, *Augilina*, naming its sole representative *A. longipes*.[10] This genus is still more widely removed from any other genus in the Caliscelinæ than is *Augila*. In my opinion these two genera should constitute a new subfamily, to come before the Caliscelinæ.

Sufamily **AUGILINÆ** novum

A subfamily of the Issidæ, coördinate with Caliscelinæ, Hemisphaerinæ, and Issinæ. Distinguished by the long and slender body, very slender abdomen, and the very long and parallel-sided membranaceous tegmina, which surpass the abdomen, and which have a strong transverse nodal vein, passing across from apex of clavus to costa, proximad of which occur very few cells. Vertex narrower than eye width and acutely produced far in front of eyes. All legs very long, the forelegs more than three times the length of head and pronotum together.

Genera of the subfamily Augilinæ.

a^1. Vertex declivous; apical area of tegmina with numerous supernumerary veinlets and cells; anterior femora and tibiæ laminately inflated.
Augila Stål.

a^2. Vertex distinctly upturned; apical area of tegmina without supernumerary veinlets, anterior femora and tibiæ not laminately inflated.
Augilina Melichar.

Synopsis of the species of Augila.

a^1. Tegmina apically evenly rounded, with at least 1 large cell before the nodal vein; length of vertex less than five times the width between eyes.

b^1. Face shorter than vertex (as figured by Melichar), and its margin straight in side view; apical area of tegmina only brown on inner portion..... **A. sulciceps** Stål.

[10] *This Journal, Sec. D* (1914), **9**, 276, Pl. I, fig. 8.

b^1. Face always longer than vertex, and its margin deeply sinuate in side view; apical area of tegmina all brown, or both sides decolored.

c^1. Tegmina with 3 large anteapical cells, one of these being in the middle area, the supernumerary cells of apical area comparatively few and all long and narrow (as figured by Distant).

A. binghami Dist.

c^2. Tegmina with only 2 large anteapical cells, without one in middle area; supernumerary cells very numerous, many short and broad.

d^1. Lateral carinæ of vertex evenly curved; the genæ very short as seen in vertex view..... **A. valdesii** sp. nov.

d^2. Lateral carinæ of vertex distinctly bisinuate on anteocular portion; the genæ long as seen in vertex view.

A. negrosensis sp. nov.

a^2. Tegmina strongly angulated at outer tip, with only 1 large anteapical cell; length of vertex more than six times width between eyes.

A. angulata sp. nov.

Augila valdesii sp. nov.

Color entirely sordid stramineous, except the legs. Forelegs darker, with 2 rather indistinct still darker bands across the fore tibiæ. Middle and hind legs white, with hind coxæ and extreme tips and bases of hind femora somewhat darkened. Tegmina hyaline, the main veins brown, the supernumerary veins red.

Length of vertex (Plate II, fig. 14) about four and one half times the width between the eyes, the lateral carinæ evenly curved, the median sulcus somewhat cross striate posteriorly, smooth anteriorly. Width of pronotum about four times the length, with 2 strong longitudinal furrows, one on each side of median line, the surface smooth. The scutellum smooth, with lateral carinæ nearer to median line than in *A. negrosensis*, and the entire area between the carinæ strongly depressed. Upper margin of head as seen from side (Plate II, fig. 17) broadly and shallowly emarginate, the margin somewhat elevated beyond the concavity. Face emarginated distinctly below the middle. Ocellus distinctly farther from the eye than its own width. Antennæ with somewhat swollen tips. Venation of apical area of tegmina as shown in Plate II, fig. 15. The male genitalia cannot be studied without dissection, which will require more material than is available; however, a partial side view, simply showing the sutures as they appear, is given in Plate II, fig. 16.

Male, length to tip of tegmina, 8.5 millimeters.

LUZON, Laguna, Mount Maquiling (*coll. Baker*).

This very distinct species is named for Julian Valdez, an orphaned Cuban, whom I took under my protection eleven years ago, and have since trained to be one of the most efficient field collectors known to me.

Augila negrosensis sp. nov.

Color piceous to black with the following parts sordid stramineous: Head above and around eyes, tip of scutellum, mesonotum, metanotum, base of abdomen above, 2 spots on inner lamina of fore tibiæ, bases of middle femora, middle tibiæ, and hind tibia toward tips. Tarsi all whitish, with the last joint black-tipped above. Tegmina hyaline, the main veins black, the apical area dark brown, the veins of apical area reddish.

Width of vertex between eyes (Plate II, fig. 20) about one fifth the length, the lateral carinæ strongly bisinuate on anteocular area, the intercarinal area at this point more deeply sulcate and with inner surface smooth and shining. Width of pronotum somewhat more than three times the length, with a strong complete median groove, the surface sparsely punctate. Scutellum minutely transversely wrinkled and with complete longitudinal carinæ on the midlateral lines. Upper margin of head, as seen from side (Plate II, fig. 21), broadly bisinuately emarginate. Margin of face in side view strongly incurved at about the middle. Ocellus distant about its own width from the eye. Antennæ nearly cylindrical. Venation of apical area of tegmina as shown in Plate II, fig. 19; wing venation as shown in Plate II, fig. 18.

Male, length to tips of tegmina, 9.5 millimeters.

NEGROS, Occidental Negros, Cuernos Mountains (*coll. Baker*).

In coloration this species strongly resembles *A. sulciceps* and *A. binghami,* but is very distinct from these in structural characters, at least as these are described and figured by Stål, Melichar, and Distant.

Augila angulata sp. nov.

Color entirely pale stramineous, the fore legs sparsely speckled with brown dots and with a single brown band across the fore tibiæ; the venter blackish; middle and hind legs white, with bases of hind femora darkened; pronotum and scutellum with a median red line. Tegmina hyaline, the veins all very pale except near inner tip, where they are reddish; the apical area brownish except along inner and outer margins.

Width of vertex (Plate II, fig. 12) between eyes about one sixth the length, the lateral carinæ very gradually curved, a large part of the median sulcus cross striate, though smooth anteriorly. Width of pronotum about three times the length, with a carina on either side of median line and a broad median sulcus between these carinæ. Scutellum smooth, with longitudinal carinæ on the midlateral areas. Upper margin of head as seen from side

(Plate II, fig. 11) not emarginate, the line slightly raised before the apex. Face emarginated just below middle. Ocellus its own width from the eye. Antennæ very short, the last joint globular. Tegmina strongly angulated at outer tips, the venation of apical area as shown in Plate II, fig. 13.

Female, length to tips of tegmina, 9.5 millimeters.

LUZON, Laguna, Mount Maquiling (*coll. Baker*).

This species differs widely from all others of the genus by the form of tegmina.

ILLUSTRATIONS

[Drawings by Baker. All, except that of the egg, are made to the same scale.]

PLATE I

FIGS. 1 to 10. *Hilda breviceps* Stål.
1, tegmina; *2*, vertex, pronotum, and scutellum; *3*, side view of head and pronotum; *4*, face in view at right angle to plane of surface between umbo and clypeus; *5*, male genitalia; *6*, female genitalia; 7, nymph; *8*, face of nymph; *9*, front view of head and pronotum of nymph in line of long axis of body; *10*, egg.

PLATE II

FIGS. 11 to 13. *Augila angulata* sp. nov.
11, side view of head; *12*, vertex; *13*, apical area of tegmina.
14 to 17. *Augila valdesii* sp. nov.
14, vertex; *15*, apical area of tegmina; *16*, side view of male genitalia; *17*, side view of head.
18 to 21. *Augila negrosensis* sp. nov.
18, apical portion of wing; *19*, apical area of tegmina; *20*, vertex; *21*, side view of head and pronotum.

TEXT FIGURE

FIG. 1. Wing of *Hilda breviceps* Stål.

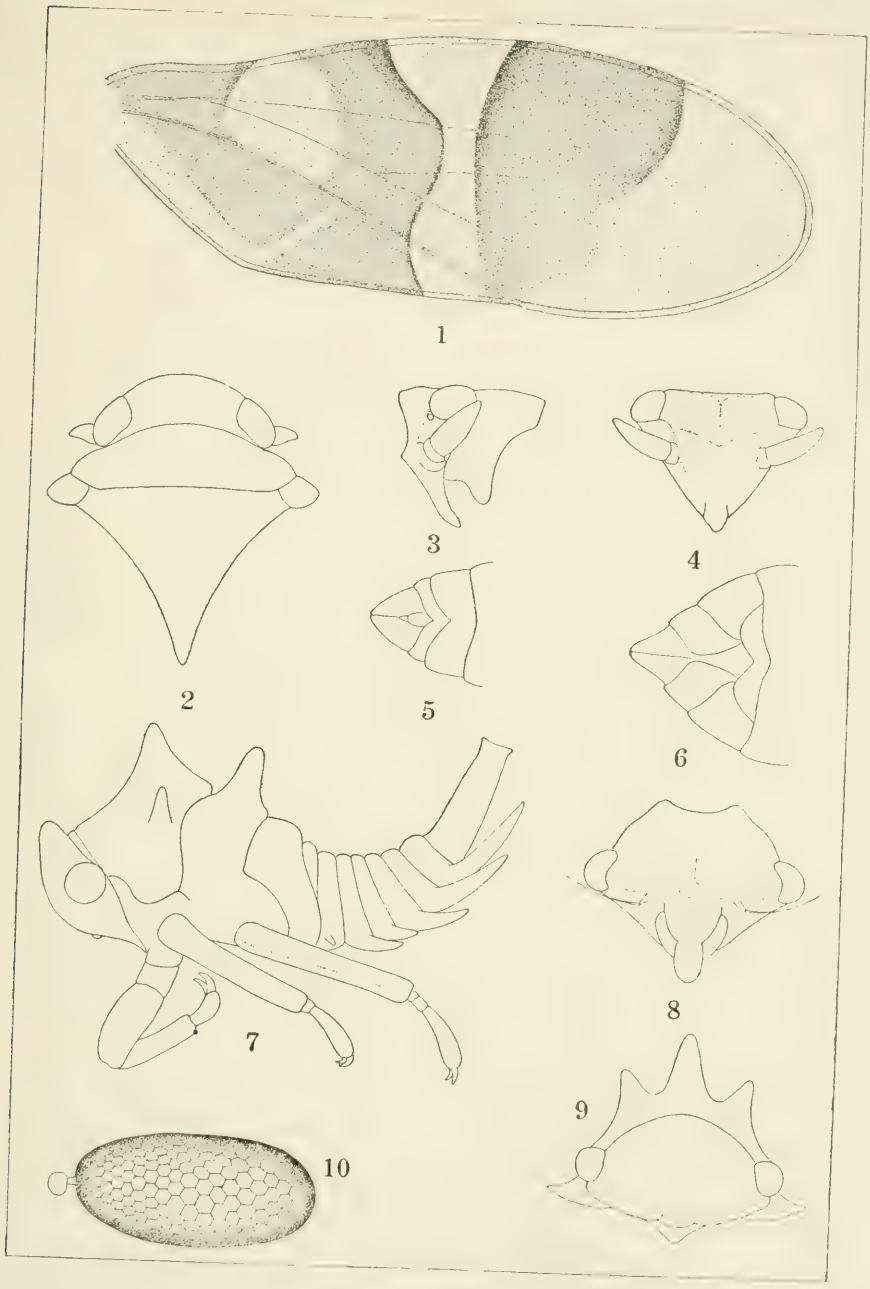

PLATE I.

Hilda breviceps Stål. 1, tegmina; 2, vertex, pronotum, and scutellum; 3, side view of head and pronotum; 4, face in view at right angle to plane of surface between umbo and clypeus; 5, male genitalia; 6, female genitalia; 7, nymph; 8, face of nymph; 9, front view of head and pronotum in line of long axis of body; 10, egg.

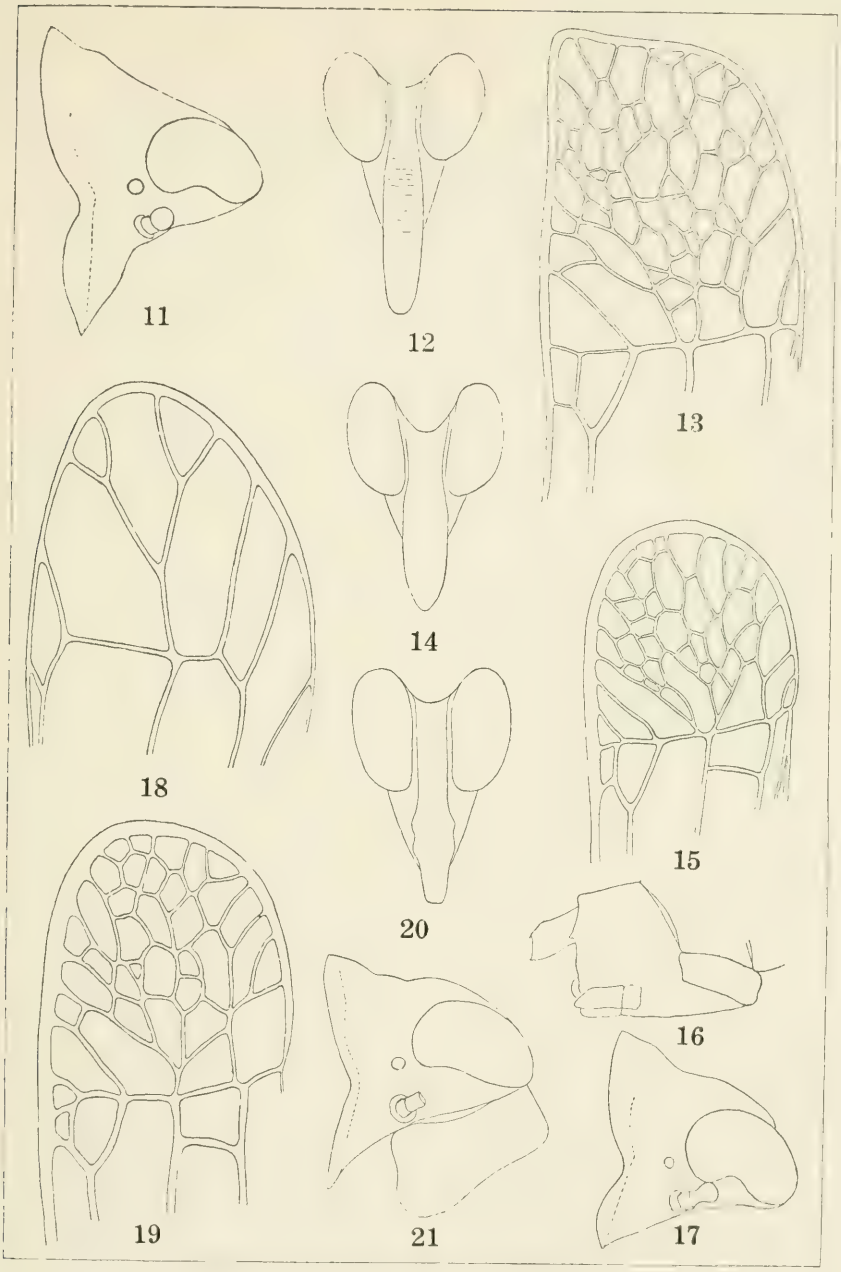

PLATE II.

Figs. 11 to 13. Augila angulata sp. nov. 11, side view of head; 12, vertex; 13, apical area of tegmina. 14 to 17. Augila valdesii sp. nov. 14, vertex; 15, apical area of tegmina; 16 side view of male genitalia; 17, side view of head. 18 to 21. Augila negrosensis sp. nov. 18, apical portion of wing; 19, apical area of tegmina; 20, vertex; 21, side view of head and pronotum.

ARE ATYA SPINIPES NEWPORT AND ATYA ARMATA MILNE EDWARDS SYNONYMS FOR ATYA MOLLUCCENSIS DE HAAN?

By R. P. Cowles

(From the Department of Zoölogy, College of Liberal Arts, University of the Philippines)

ONE TEXT FIGURE

In 1868 Eduard von Martens [1] stated that he had received several specimens of the genus *Atya* from the Philippine Islands. The specimens differed from one another in the size and armature of the third legs and in the body length, but they were otherwise similar, and von Martens reached the conclusion that they were all of the same species. The largest specimen agreed with *Atya armata* Milne Edwards,[2] collected in the Philippines, and described as having a long heavy spine on the lower border of the merus of the third leg. However, von Martens's smaller specimens agreed with the description of species of *Atyoida* in which the third legs are but slightly larger than the fourth and fifth and in which there is only a weak, slender, and inconspicuous spine on the merus. Specimens intermediate in size showed gradations from the large third legs with the heavy spine to the small third legs with the weak inconspicuous spines. As a result of his observations von Martens rightly discarded the genus *Atyoida,* considering the specimens upon which it was based as the young of some species like *Atya armata.*

Recently I have collected atyas from a mountain stream near Manila and have obtained a series similar to that of von Martens's. The largest males agree very well with the description of *Atya armata* except that the lower margin of the rostrum is toothed, a fact which has been observed by Bouvier. In a series arranged according to the body length, the third legs grade in size from a condition found in the largest males, where they are much larger than the fourth and fifth legs, to a condition found in the small males, where they are of about the same size as the fourth and fifth legs. The graded reduction in the size

[1] *Arch. f. Naturgeschichte* (1868), **34.** 47.
[2] *Ann. Soc. ent. France* (1864), **33.** 47.

of the spine on the merus of the third legs is evident in this series in passing from the old males to the younger males. Before having seen von Martens's paper, I had come to the conclusion that I was dealing with the young and old of the same species, which increases the value of my confirmation of von Martens's observation.

The exceptionally large third legs are characteristic only of the old males in our specimens. In the females the third legs are always a little larger than the fourth and fifth, but they never approach the size found in the large males. Furthermore the large heavy spine is not present in the females, but in its place there are the slender acute spines similar to the ones which are found in the young males.

A comparison of 7 specimens, the largest 70 millimeters and the smallest 25 millimeters in length, shows interesting gradations in the size and character of the spines on the third, fourth, and fifth legs.

Specimen 1 (museum No. 1380) is an old male, 70 millimeters in length, with 3 teeth on the ventral border of the rostrum. The right third leg has a large immovable spine on the ventrolateral surface of the merus near the distal end. The merus of the right fourth leg has 1 slender movable spine almost ventral in position and near the distal end. The merus of the right fifth leg has 2 slender movable spines which are ventral in position, one being near the distal end and the other at about the middle. The conditions are similar for the left legs, except that on the merus of the fifth leg there is no spine in the middle region (fig. 1, *a, b, c*).

Specimen 2 (museum No. 1371) is a slightly younger male, 56 millimeters long, with 5 teeth on the ventral border of the rostrum. The merus of the right third leg has 1 large immovable spine, smaller than the spine in specimen 1, on the ventrolateral surface near the distal end. The merus of the fourth leg has 2 slender movable spines, one near the distal end and the other about one third of the length of the merus posterior to the distal end. The merus of the fifth leg shows 3 slender movable spines, the most posterior being two thirds of the length of the merus posterior to the distal end. The conditions are similar for the left legs (fig. 1, *d, e, f*).

Specimen 3 (museum No. 1371) is 58 millimeters long and has 4 teeth on the ventral border of the rostrum. Although this specimen is 2 millimeters longer than specimen 2, its third legs are not so heavy, and I consider it to be less mature. The merus of the right third leg bears 2 spines—a heavy immovable

one in the usual position but smaller than that of No. 2 and a slender slightly movable one anterior to it. This slender spine seems to correspond to the one Milne Edwards described for the type of *Atya armata*. The merus of the right fourth leg bears 3 movable spines, the most posterior of which is situated at about the middle of the length of the merus. The merus of the right fifth leg has 2 movable spines. Similar conditions are found in the left legs, except that the merus of the fifth leg bears 3 movable spines (fig. 1, *g*, *h*, *i*, *j*).

Specimen 4 (museum No. 1371) is 56 millimeters long, and I

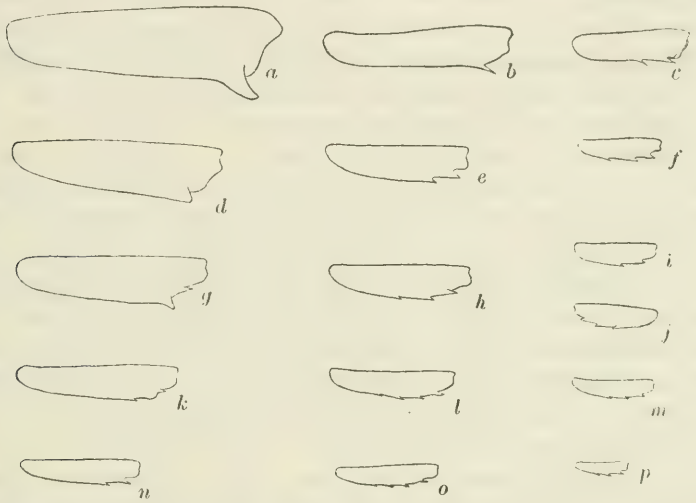

FIG. 1. *Atya molluccensis* de Haan. *a*, *b*, *c*, specimen 1, meri of the right third, fourth, and fifth legs, respectively; *d*, *e*, *f*, specimen 2, meri of the right third, fourth, and fifth legs, respectively; *g*, *h*, *i*, specimen 3, meri of the right third, fourth, and fifth legs, respectively; *j*, specimen 3, merus of the left fifth leg; *k*, *l*, *m*, specimen 4, meri of the right third, fourth, and fifth legs, respectively; *n*, *o*, *p*, specimen 5, meri of the right third, fourth, and fifth legs, respectively.

consider it to be less mature than any of the specimens already mentioned. It has 6 teeth on the lower border of the rostrum. The merus of the right third leg has 2 sharp movable spines (the most distal one is only slightly movable) and a swelling between the two, the latter indicating the beginning of the heavy spine of older specimens. The merus of the right fourth leg has 4 slender movable spines, and the merus of the fifth legs bears 3 movable spines. The conditions are similar for the left legs (fig. 1, *k*, *l*, *m*).

Specimen 5 (museum No. 1371) has 6 teeth on the lower border of the rostrum and is 42 millimeters long. There are 2 movable spines on the merus of the right third leg, 4 movable spines on

the merus of the fourth leg, and 3 movable spines on the merus of the right fifth leg. The conditions are similar for the left legs, except that there are only 3 spines on the merus of the fourth leg (fig. 1, *n*, *o*, *p*).

Specimen 6 (museum No. 1371) is 34 millimeters long and has 3 teeth on the lower border of the rostrum. There are 2 movable spines on the merus of the right third leg, 4 on the merus of the right fourth leg, and 3 on the corresponding segment of the fifth leg. The conditions are similar for the left legs.

Our smallest individual, specimen 7 (museum No. 1377), is 25 millimeters long and has 4 teeth on the lower border of the rostrum. There are 3 movable teeth on the merus of the right third leg, 4 movable teeth on the merus of the right fourth leg, and 3 movable teeth on the merus of the right fifth leg. The conditions for the left legs are similar.

The third leg is conspicuously larger in diameter than the rest of the legs in specimen 1, but this difference becomes gradually less marked in Nos. 2, 3, and 4, and it is hardly noticeable in the smaller specimens. These 7 specimens show a reduction in the number of spines on the merus of the fifth leg from 3 movable spines in specimen 7 to 1 or 2 movable spines in specimen 1; on the merus of the fourth leg they show a reduction from 4 movable spines in specimen 7 to 3 movable spines in specimen 3, to 2 movable spines in specimen 2, and to 1 movable spine in specimen 1; on the merus of the third leg they show a reduction from 3 movable spines in specimen 7 to 2 movable spines in specimen 6, to 2 movable spines (the most distal only slightly so) and the rudiment of the heavy spine between the two in specimen 4, to 1 slightly movable spine and 1 immovable spine in specimen 3, and to 1 immovable spine in specimens 1 and 2. It is probable that all of these specimens belong to the same species; that with increasing age or degree of maturity there is a reduction of the number of spines on the meri of the third, fourth, and fifth legs; that on the approach of maturity in the male the heavy spine begins to make its appearance (specimen 4) on the merus of the third leg; that during the succeeding molts the heavy spine becomes well developed and the slender movable spine posterior to the heavy spine disappears (specimen 3); and finally, that the slender spine anterior to the heavy spine ceases to exist (specimens 1 and 2).

I am very much inclined to believe that *Atya spinipes* Newport,[3] described from a specimen found in the Philippines, is a

[3] *Ann. & Mag. Nat. Hist.* (1847), **19**, 159.

young male or female of the form described by Milne Edwards as *Atya armata* and that Newport failed to record the toothing on the lower border of the rostrum.[4] In fact, Milne Edwards states that *Atya armata* differs from *Atya spinipes* with regard to the spines on the third legs and in that the merus of *Atya spinipes* is smooth. (Newport, however, describes it as almost smooth.) If a comparison of the specimens in our collection with the types of *Atya armata* A. Milne Edwards and *Atya spinipes* Newport should show that the young are identical with the latter and the old with the former, *A. armata* and *A. spinipes* should be considered as identical.

Finally, it seems probable from the work of Miers,[5] de Man,[6] and Bouvier [7] that *Atya armata* A. Milne Edwards is synonymous with *Atya molluccensis* de Haan, and from my own observations that *Atya spinipes* Newport also is synonymous with the latter species.

[4] Dr. W. T. Calman informs me by letter that Bouvier figures the type of *Atya armata* with teeth on the lower side of the rostrum and that he (Calman) finds these teeth are present in many if not all the specimens that he has referred to *Atya molluccensis* and to *A. spinipes*.

[5] *Ann. & Mag. Nat. Hist.* (1880), **5**, 382.

[6] Zoologische Ergebnisse einer Reise in Niederländish Ost-Indien (1892), **2**, 357.

[7] *Bull. Sci. France et Belgique* (1905), **39**, 113.

ILLUSTRATION

TEXT FIGURE

FIG. 1. *Atya molluccensis* de Haan.

a, *b*, *c*, specimen 1, meri of the right third, fourth, and fifth legs, respectively; *d*, *e*, *f*, specimen 2, meri of the right third, fourth, and fifth legs, respectively; *g*, *h*, *i*, specimen 3, meri of the right third, fourth, and fifth legs respectively; *j*, specimen 3, merus of the left fifth leg; *k*, *l*, *m*, specimen 4, meri of the right third, fourth, and fifth legs, respectively; *n*, *o*, *p*, specimen 5, meri of the right third, fourth, and fifth legs, respectively.

NOTES ON PHILIPPINE ALCYONARIA

PART IV: NOTES ON PHILIPPINE STOLONIFERA AND XENIIDÆ

By S. F. Light

(*From the Zoölogical Laboratory, College of Liberal Arts, University of the Philippines*)

While the littoral alcyonarian faunæ of Zanzibar, Ternate, Amboina, and of the Maldive and Laccadive Archipelagoes have been studied by well-known scientists—Kükenthal, Hickson, Schenk, May, Thomson and Henderson, and others—the remarkably rich and varied fauna of the numberless shallow-water coral reefs of the Philippine Archipelago seems almost entirely to have been neglected. With the exception of the few littoral specimens collected by the *Challenger* expedition at Mactan Island, near Cebu, and at Zamboanga, Mindanao,[1] and a few specimens collected by Sanderson, Jagor, and Müller,[2] the shallow-reef *Alcyonaria* of the Philippine Islands have been practically untouched. The *Alcyonaria* collected by the United States Bureau of Fisheries steamer *Albatross* in Philippine waters have not been reported on, but it is to be expected that they will be mainly deep-sea or deep-littoral forms.

It is not strange, therefore, that we find but two species of the suborder Stolonifera recorded from the Philippines: *Tubipora musica* Linnæus, recorded by Wright and Studer [1] from Zamboanga, and *Clavularia inflata* Schenk var. *luzoniana* May, reported by May [2] from Albay Province, Luzon.

The alcyonarian collection of the University of the Philippines is made up of *Alcyonaria* collected on the joint scientific expeditions of the University of the Philippines and the Philippine Bureau of Science to Port Galera Bay on the northern coast of Mindoro and to Taytay Bay on the east coast of Palawan, of many specimens collected by Griffin and Wharton in the Bantayan Islands off the northwest coast of Cebu, of a large number of specimens from the interisland cables in various localities and

[1] Wright, E. P., and Studer, Th., Report on the Alcyonaria collected by H. M. S. Challenger during the years 1873–87. The voyage of H. M. S. Challenger, Zoology. London (1889), 31, v–lxxii + 1–314, Pls. I–XLII.

[2] May, S. J., Beiträge zur Systematik der Alcyonaceen, *Jena. Zeitschr. f. Naturw.* (1899), 33.

at depths of from 20 to 300 meters collected by Day and Light, and of a few specimens from Mariveles at the mouth of Manila Bay. This collection contains a large series of specimens of Stolonifera and Xeniidæ from these widely separated localities, and gives a very good idea of the relative abundance and distribution of the species of these groups in the Islands.

Although dredging has been carried on by various expeditions in the waters of the Philippines, no species of deep-sea or deep-littoral Stolonifera or Xeniidæ has been reported from the Islands, and all the specimens in our collection, with two exceptions, are from shallow-water reefs. One of these exceptions is a small species of *Cornularia* with minute polyps and a perisarclike horny covering on the basal portion of the polyps and on the stolons. It was found growing on a large colony of *Siphonogorgia variabilis* Hickson taken from a cable at a depth of 90 meters. The other is a specimen from a cable at a depth of from 20 to 100 meters, and is probably an undescribed species of *Cespitularia.*

While on the collecting expeditions mentioned I had excellent opportunities for observing the Philippine species of Stolonifera and Xeniidæ in their habitat. One cannot but be impressed by the flowerlike beauty of the large distinct polyps of *Anthelia* and *Xenia.* With their beautiful iridescent shades of blue and green or rich velvety brown, their gracefully flexible polyps waving with the currents, and their slender featherlike tentacles they present a picture of unusual grace and charm. The smaller, shorter, and more rigid starlike distal moieties of *Tubipora,* or of *Clavularia violacea* Quoy and Gaimard with their solid green, blue, or light velvety brown colors, present a decidedly different appearance, but one as distinctly pleasing; and the sudden change, which takes place when the colony, disturbed by some sudden jar or by a shadow, suddenly retracts the distal moieties of its polyps, exposing the red expanse of the rest of the colony, is very startling. Preserved specimens lack much of this beauty of form and color, but they are still among the most beautiful specimens of a collection. The difference in appearance in preserved pieces from the same colony is often so great that one might easily believe that they were specimens of different species. Studies of these forms carried on in their habitats and accompanied by colored drawings of the living colonies and by figures of polyps or entire colonies killed in contraction and of others killed in expansion would be of great value in putting the classification of the species of these genera on a more secure and scientific basis. I have found that fully expanded specimens may be

obtained best by allowing them to expand in aquaria and adding magnesium sulphate a little at a time until they are so anæsthetized as to cease to respond to stimuli, after which they may be placed in the preserving fluid. Most of our specimens are preserved in from 4 to 10 per cent formalin and remain much more flexible and keep their color longer than those preserved in alcohol. However, some specimens which have been in formalin for a number of years are beginning to show signs of degeneration, and alcohol seems to be a better preservative for museum specimens.

Our collection contains species belonging to each of the four clearly defined and well-known genera of the Cornulariidæ: namely, *Cornularia* Lamarck, *Anthelia* Savigny, *Clavularia* Quoy and Gaimard, and *Sympodium* Ehrenberg. I follow Kükenthal [3] in retaining the well-defined and distinct genus *Anthelia* and in dropping the generic name *Rhizoxenia* for which Müller has recently tried to make a case.[4] The type species, *R. thalassantha,* judging from Lesson's description [5] and from Haeckel's figures,[6] is undoubtedly a species of *Clavularia.* This makes it necessary to drop the name *Rhizoxenia,* and if the genus is still retained it must be given Philippi's name *Evagora,*[7] first used for *E. rosea* (*R. rosea* of Dana, von Koch, and others). If the genus is not retained, those of its species whose polyps are entirely retractile will fall within the genus *Sympodium;* and those whose polyps have a distal moiety retractile within a proximal moiety, within the genus *Clavularia.* It also seems best, as Schenk [8] has pointed out, to consider *Stereosoma celebense* Hickson [9] as a species of *Anthelia* in order to prevent the possibility of a recurrence of such a confusion of genera as has until recently existed in the family Cornulariidæ. Hickson's arrangement of the genera of the Cornulariidæ [10] in which he places *Cornularia* and *Stereosoma* in a separate family, the Cornulariidæ, characterized by their lack of spicules and pre-

[3] Kükenthal, W., Die Stammesgeschichte und die geographische Verbreitung der Alcyonaceen, *Verhandl. d. deutsch. Zool. Ges.* (1906), 138.

[4] Über die Alcyonaceen-Gattung *Rhizoxenia* Ehrenberg, *Mitt. a. d. Zool. Stat. zu Neapel* (1910), **20**, 94–99.

[5] I have not had access to Lesson's work, but the important part of his description is given by Müller in footnote 1, p. 94, of the volume cited above.

[6] Arabische Korallen. Berlin (1875).

[7] Zoologische Beobachtungen, *Arch. f. Naturg.* (1842), **8**, 33–45.

[8] Clavulariiden, Xeniiden, und Alcyoniden von Ternate, *Abhandl. d. Senkenb. naturf. Ges.* (1896), **23**, pt. 1.

[9] *Trans. Zool. Soc. London* (1895), **13**.

[10] The Cambridge Natural History, Coelenterata and Ctenophora (1906), 1.

sumably, although he does not mention it, by the horny secretion common to both, seems to me to be essentially artificial, as the absence of spicules is not a safe diagnostic character in this instance—I have a species of *Anthelia* which is without spicules and one is mentioned by May—and further, the horny secretion seems to be of a different nature, position, and perhaps origin in the two species involved.

I have recently received a specimen of *Cornulariella modesta* Verrill in exchange from the United States National Museum. From an examination of this specimen I can confirm Hickson's decision that while this species is, no doubt, distinctly different from the other known species of *Clavularia*, it agrees with them in generic characters and shows no other distinctive characters which would justify its separation to form the genus *Cornulariella*.

The genus *Anthelia* is the most abundant genus of the Cornulariidæ found on the reefs of the Philippines. It is especially abundant in inclosed bays, such as the one at Port Galera, Mindoro, where it is present on all the shallower parts of the reefs. It forms incrusting growths over dead coral, débris, stones, and on the hard sand bottom. We have one specimen carried on the back of a *Dromia*-like crab, which it entirely covers in much the same way as the sponge does the closely related *Cryptodromia tuberculata* Stimpson as described by Cowles.[11] The commonest species agrees very well with *Anthelia fuliginosa* (Ehrbg.) Kükenthal.[12] We have a large series of specimens of this very variable species preserved in formalin, showing all the forms mentioned by Kükenthal, including the "*sympodium purpurascens*" form which seems distinct enough to be considered a separate species. In life *A. fuliginosa* is rich velvety brown or brownish green, the color being due, as in most reef *Alcyonaria*, to the presence in the endoderm of large numbers of symbiotic unicellular algæ of the *Zoöxanthella* type. The long flexible polyps with slender, extended, and constantly moving tentacles have a strikingly flowerlike appearance. *Anthelia fuliginosa* is common in the Red Sea, and according to Kükenthal [12] is the only species of the genus to be found there. May has reported it from Zanzibar,[13] and its wide distribution in the

[11] Cowles, R. P., The habits of some tropical Crustacea, *This Journal, Sec. D* (1913), **8**, 119.

[12] Über einige Korallenthiere des Rothen Meeres. Festschrift zum siebzigsten Geburtstag von Ernst Haeckel, *Denks. Med. Natur. Ges., Jena* (1904), **11**, 43.

[13] *Jena. Zeitschr. f. Naturw.* (1899), **33**.

Philippines—we have specimens from Mindoro and Palawan—makes it the most widely distributed and commonest species of the genus. Undoubtedly it will be found to be a common species in the other islands of the East Indies if, indeed, it has not already been described from those regions under another name.

The three or four other species of the genus in our collection are each represented by but a few specimens, and some or all of them are probably new to science. One is interesting in that it appears to be similar to *Rhizoxenia primula* Dana,[14] but the polyps are connected by a slender creeping stolon attached to a piece of dead *Millepora*. It seems very probable, as Dana himself suspected, that such a stolon existed in his specimen, but was overlooked when the drawing was made. Another beautifully expanded specimen agrees very closely with May's *Clavularia longissima* which is, of course, a species of *Anthelia*.

Next in number of species and in distribution in the Philippines is the genus *Clavularia* Quoy and Gaimard, of which there are specimens of 3 or more species in our collection. Conspicuous among these are numerous specimens of *Clavularia* (*Hicksonia*) *viridis* Quoy and Gaimard. This, as Hickson predicted,[15] is one of the common, it not the commonest species of *Clavularia* on our reefs. Its habits agree exactly with those given by Hickson for the same species in Celebes. Kükenthal[16] speaks of this species under the names *Anthelia celebensis* and *Anthelia viridis*. This is probably to be accounted for by Hickson's misleading statement "in habit it (*Clavularia celebensis*) is very similar to *C. viridis*." The species described by Hickson as *Clavularia celebensis* must be considered as a species of *Anthelia*, but the species described and figured by Quoy and Gaimard[17] and by Hickson as *Clavularia viridis* is distinctly different, and since it has polyps whose distal portions are retractile within their proximal portions it is a species of *Clavularia*, unless the facts that the stolons originate at different heights on the polyps and that it has a horny skeleton be considered sufficient to place it in a separate genus (*Hicksonia*).[18]

A careful investigation of the anatomy of *Clavularia viridis*

[14] Dana, J. A., United States exploring expedition during the years 1838, 1839, 1840, 1841, 1842, under the command of Charles Wilkes, U. S. N. Atlas. Zoophytes. Philadelphia (1849).

[15] *Trans. Zool. Soc. London* (1895), 13.

[16] *Verhandl. d. deutsch. Zool. Ges.* (1906), 142.

[17] Zoologie du Voyage de l'Astrolabe (1834).

[18] Delage and Herouard, Les Coelentères. Traité de Zoologie concrète. Paris (1901), 3.

would undoubtedly add many interesting facts to our knowledge of the finer structure of the *Alcyonaria*. A brief study of sections stained with iron hæmatoxylin has brought out several points of interest. The walls of the stomodæum are composed of the usual columnar epithelium cells—very long and slender and containing elongated, deeply staining nuclei so arranged as to give the appearance of pseudo-stratified epithelium. Scattered among these cells are large gland cells containing a varying amount of deeply staining granules. These cells are slender distally and often entirely filled in their outer portions at least with the glandular products, and I have been unable to make out any nucleus in the outer portion. Lying between the epithelial layer and the mesoglœa is an irregular layer made up of the large, broadly oval bases of the cells with centrally placed, spherical, lightly staining nuclei, the membrane and a minute central nucleolus of which are the only parts which take the stain. It is very difficult to make out a connection between this basal portion and the outer spindle-shaped glandular portion, but I have been able to do so in a number of cases. The granular material of the outer portion of these cells takes an intense blue-black stain in Heidenhein's iron hæmatoxylin, and in a few instances I have found these cells discharging their contents into the stomodæal cavity. Ashworth [19] has noted gland cells in the stomodæal walls of *Xenia* and explains their presence as being due to the absence of mesenterial filaments and the consequent necessity for the assumption of the digestive function by the stomodæum. I have found these gland cells to be present, however, in the stomodæal walls of *Cornularia minuta*,[20] *Lithophytum rigidum*, and *L. philippinensis*;[21] in *Capnella ramosa* and *C. philippinensis*;[22] and even in the genera *Lemnalia* and *Lemnalioides*,[23] where the mesenterial filaments are remarkably long, reaching to the base of the colony.

Scattered at more or less regular intervals in the inner portion of the stomodæal wall are numerous short oval cells, each containing an oval nematocyst about 0.009 millimeter in length with a spirally coiled thread. The nematocyst seems to crowd

[19] Xeniidæ, Willey's Zool. Res. (1900), **4**, 68.

[20] Light, S. F., Notes on Philippine Alcyonaria, part V: Cornularia minuta sp. nov., *This Journal, Sec. D* (1915), **10**, No. 3.

[21] Ibid. (1915), **10**, No. 3.

[22] Ibid. (1913), **8**, 435.

[23] Ibid. (1914), **9**, 233.

the cell, and the nucleus fits over its inner end like a cap. The nuclei of these cells are at about the same level and form a more or less regular row beyond the nuclei of the epithelial cells. So far as I have been able to ascertain, this is the first alcyonarian in which nematocysts have been found in the stomodæal walls. It is probable that its large size allows *C. viridis* to ingest fair-sized living animals which are killed by the discharge of nematocysts, preliminary to being digested in the stomodæum by the products of the gland cells already described.

The cells of the siphonoglyphe, which is very distinct, are extremely long and slender with very long, slender, rod-shaped nuclei.

As Hickson [24] has pointed out the muscular ridges of the mesenteries are very numerous and long. In my experience *C. viridis* is only second in this regard to *C. violacea* Quoy and Gaimard, in which the muscle banners are enormously developed.

Hickson [24] speaks of the horny skeletal elements of *C. viridis* as being present in wide lacunæ in the mesoglœa and figures them there in section as deeply staining bodies. In his figure the spaces are much smaller in proportion to the size of the central bodies than in my specimens. Indeed, after studying an extensive series of sections, I am convinced that the structures which Hickson figured as skeletal elements are merely the nuclei of spicule-forming cells. The true skeletal fibers are to be found in the ectoderm, appearing in sections as deeply staining crescents averaging 0.01 millimeter in length and 0.003 millimeter in greatest diameter. In a few instances these bodies are found in the edge of the mesoglœa, in which case they are always associated with large cells evidently amœboid in character and characterized by a very distinctly reticulated cytoplasm, a small central nucleus with a number of chromatin centers, and a few deeply staining granules in the cytoplasm. Further study may show these cells to be the skeleton-producing cells.

Another striking and widely distributed Philippine species of *Clavularia* is *Clavularia violacea* Quoy and Gaimard.[25] We have numerous specimens of this from Mindoro and Palawan and single specimens from Bantayan and from Mariveles. The red of the proximal portions of the polyp and of the base and the brillant green of its distal moieties make it a very conspicuous reef alcyonarian. The distal moieties of the polyps have about

[24] *Trans. Zool. Soc. London* (1895), 13.
[25] Zoologie du Voyage de l'Astrolabe (1834).

the same color, size, and shape as those parts in *Tubipora*, which is common in the same habitat, and the colonies of one genus are easily mistaken for those of the other when seen at a distance.

This very interesting alcyonarian is here reported for the first time since Quoy and Gaimard reported it from Vanokoro in 1834. Among their figures are an oral view of a polyp and a view of the cut surface of a contracted polyp cut in half longitudinally. A brief study of the numerous specimens in our collection has shown several errors made by Quoy and Gaimard in their rather superficial study of the polyp. In their figure of the oral view of the polyp they show no pinnules on the tentacles. An examination of a number of specimens both externally and in sections has shown that they were correct in this observation, the tentacles showing no vestiges of pinnules. In the drawing of the half polyp, however, the tentacles are figured as being completely introverted and appear to have numerous pinnules, and a high conical hypostome is shown on the oral surface. A superficial examination of a contracted polyp cut in two longitudinally gives much the same impression as the drawing of Quoy and Gaimard, but a more careful investigation shows that the yellow mass below the oral surface is composed of the mesenteries, which are thickened at that point and surround the central stomodæum. The conical hypostome of Quoy and Gaimard resolves itself into the contracted tentacles, which form a conical mass just above the oral surface.

The absence of any vestige of pinnules makes this a very remarkable form, and there are many other equally interesting characters which would well repay a detailed investigation. Some of these are: The presence of a reticulated mesoglœa containing besides spicules large canals lined with ectodermal cells which contain a few unicellular algæ; the presence of an external cuticle; the presence in the distal moiety of an ectoderm of very high columnar epithelium strikingly different from that of any other known alcyonarian; the presence near the junction of the proximal and distal moieties between the ectoderm and the true mesoglœa of a reticulum composed of outgrowths from the mesoglœa in whose meshes lie small irregular-shaped ectoderm cells; and lastly the enormous development of the muscular ridges of the mesenteries and the peculiar structure of the swollen, upper portion of the mesenteries in which the mesoglœa is finely reticulated and contains numerous symmetrically placed, deeply staining, irregular-shaped bodies.

The finer anatomy of *Clavularia viridis* and *C. violacea* is a fascinating subject, and I hope at some time to be able to take it up more fully. A third species of *Clavularia* seems to be rather variable in form and size, and will probably be found to be Schenk's *Clavularia inflata.*[26] Some specimens agree with May's *C. inflata* var. *luzoniana.*[27] This is the only species of *Clavularia* reported from the Philippines. May [27] reports it from Albay Province, Luzon, and we have specimens from Bantayan Island, Mindoro Island, and Mariveles, Luzon. A few other specimens may prove to belong to a new species of the genus.

To the genus *Sympodium* I am assigning a number of incrusting colonies which have *Xenia*-like but retractile polyps and numerous small disk-shaped spicules. With one exception they were found growing on the branches of dead *Madrepora.* They will probably prove to belong to two or three new species. I recall finding on one of the reefs near Taytay, Palawan, a small pocket or hole, somewhat deeper than the remainder of the reef and just inside the growing edge, which was filled with a mass of branches of dead *Madrepora.* Growing on the branches and connected by ribbonlike stolons were hundreds of colonies of what appeared to be a species of *Xenia,* ashy gray in color. On collecting them, I found that the fleshy stalk characteristic of *Xenia* was replaced by an incrusting membranous base into which the polyps were entirely retracted when disturbed. It is colonies of this type which I consider to belong to the genus *Sympodium* now that the older species have been removed to the genus *Alcyonium* where they more properly belong. It is interesting to note how much more closely the polyps of these species resemble those of *Xenia* in color, in the size and arrangement of the pinnules, and in the general appearance in both living and preserved specimens than they do those of *Anthelia* to which they would seem to be more closely related.

The only species of *Cornularia* in the collection, and the first to be reported from Asiatic waters, is the small form spoken of before as having been found growing on colonies of *Siphonogorgia variabilis* Hickson from the cable in Albay Bay at a depth of 90 meters. The minute size of this form—the polyps are not more than 2.5 millimeters in height when fully expanded and the stolons are threadlike—and the peculiar thin horny covering of the lower portions of the polyps and of the stolons, which has

[26] *Abhandl. d. Senckenb. naturf. Ges.* (1896), 23, pt. 1.
[27] *Jena. Zeitschr. f. Naturw.* (1899), 33.

a striking resemblance, particularly in sections, to the perisarc of many hydroids, make it certain that this is a new species of this very interesting genus. I am having sections made and shall make a report on the structure of the form in the near future.

Tubipora, probably belonging to the single species *T. chamissons* Ehrbg. as Hickson [28] believes, is common on all the reefs of the Philippines which I have visited and has been reported from Zamboanga by Wright and Studer.[29] In the Philippines it is, as Crossland [30] reports from Zanzibar, "abundant wherever coral grows." Philippine specimens show three distinct color varieties, in one of which the distal moieties of the polyps are pale blue, in another bright green, and in the third light velvety brown, and many variations as to the length and diameter of the tubes are to be found.

The xeniid fauna of the Philippine reefs, particularly of the sheltered reefs, such as those in Port Galera Bay, Mindoro, and in the Bantayan Islands, is luxurious and varied. The species of this family and of the Cornulariidæ thrive in similar habitats, both being numerous at Port Galera Bay and Bantayan but strikingly scarce on the reefs of the eastern coast of Palawan. Why these reefs are unsuited for the growth of such forms is hard to say, unless it be because of their more exposed position. This hypothesis seems to be supported by the fact that the few colonies which were obtained in Palawan waters were found on the reefs to the landward side of Pabellones Island and of another small island in the bay. This does not seem to hold good, however, in the case of Sabong Cove, near Port Galera, Mindoro, which is exposed, and yet has a rich fauna in the genera *Clavularia* and *Xenia* and especially in the rarer genus *Cespitularia*.

Our collection contains species of each of the three genera of the family of Xeniidæ: namely, *Xenia* Savigny, *Cespitularia* Valenciennes, and *Heteroxenia* Kölliker. As elsewhere, the species of *Xenia* are more numerous than those of *Heteroxenia* and *Cespitularia*, although the species of the last-named genus are unusually abundant in Philippine waters.

We have a very large series of specimens of *Xenia* belonging to a number of species, some of which are no doubt new. The separation of the species of this genus presents great difficulties

[28] Alcyonaria of the Maldives, Fauna and geog. of the Maldive and Laccadive Archipelago, 2, pt. 1, 473–500.

[29] The voyage of H. M. S. Challenger, Zoology (1889), 31.

[30] Thomson and Henderson, Marine Fauna of Zanzibar etc. from collections made by Cyril Crossland, *Proc. Zool. Soc. London* (1906).

owing to the lack of fixed characters and the instability of such diagnostic characters as are used; for example, the number of rows of pinnules, as their shape and their relative size and positions differ to a great extent with the state of contraction of the colony when killed. The same difficulty is encountered in the genus *Anthelia.* Systematic work on the species of these genera should deal first with the living animals and then with the preserved specimens.

One colony of *Xenia* is of interest in that it consists of many small branched or single stalks bearing unusually small polyps. These stalks, which are scattered over the branches of a dead colony of *Seriatopora,* are connected by slender creeping stolons. A number of other specimens are very similar to *Xenia hicksoni* Ashworth,[31] and one resembles *Xenia rigida* May,[32] but shows no dimorphism.

The collection contains specimens of *Heteroxenia elisebethæ* Kölliker [33] from two localities which show the marked dimorphism maintained by Kölliker,[33] Bourne,[34] Ashworth,[31] and others, but denied by May,[32] Schenk,[35] Haacke,[36] Kükenthal,[37] and others. The number of siphonozooids is so great in proportion to the number of autozooids, their size is so uniform and so much less than that of the autozooids, and these conditions have been noted by so many independent workers for specimens from so many widely separated habitats that it seems hardly conceivable that we have here merely growing polyps. If they are only autozooids in different stages of development why should so many young polyps of the same age be found on the same colony and why should observers in so many different parts of the world and at different seasons of the year find them at the same stage of development as far as the tentacles are concerned and of the same average size? The fact that one can find at the edge of the capitulum series of young autozooids approximating in differing degree the size and form of the mature autozooids tends rather to strengthen the case for dimorphism than to weaken it, for were such developing autozooids never found we would

[31] Xeniidæ, Willey's Zool. Res. (1900), 4, 68; and Xenia Hicksoni, nov. sp., *Quar. Journ. Roy. Micr. Soc.* (1891), n. s. 42.

[32] *Jena. Zeitschr. f. Naturw.* (1899), 33.

[33] Heteroxenia, *Fest. d. Physical. Med. Ges. in Würzburg* (1874), 13.

[34] *Phil. Trans.* (1895).

[35] *Abhandl. d. Senckenb. naturf. Ges.* (1896), 23, pt. 1.

[36] *Zool. Garten* (1886).

[37] Versuch einer Revision, etc. 9. Xeniiden. *Zool. Jahrb., Syst.*(1901), 17.

be forced to believe either that such colonies had reached a maximum development or that the so-called siphonozooids were immature autozooids as Kükenthal, May, and Schenk contend.

One specimen, which may be simply a contracted specimen of *H. elisebethæ*, shows a strong resemblance to *Xenia rigida* of May,[38] which is a species of *Heteroxenia* as evidenced by its dimorphism.[39] Another specimen has a few siphonozooids similar to those of *H. elisebethæ*, crowded in the center of the capitulum, and autozooids whose distal moieties appear both externally and in section to be able to retract within the cavities of the proximal portions—that is, within the fleshy stalk. This character has been noted by Hickson in *H. capensis*,[39] but the other characters make it probable that we have here a new species of *Heteroxenia*.

In the genus *Cespitularia* we have a very interesting series of specimens belonging to several different species. They range from decidedly *Xenia*-like colonies, with long flexible polyps which have all the appearance of the polyps of the ordinary reef *Xenia*, the polyp-bearing portion of which, however, shows the characteristic branching of the genus, to decidedly treelike colonies with small polyps approaching in appearance the polyps of the Nephthyidæ and especially of the genus *Lithophytum*. Several specimens resemble very closely *Cespitularia coerulea* May. Another form has large delicate polyps, the tentacles of which can be folded in over the oral surface. Still another, a distinctly treelike colony from a cable at a depth of from 20 to 100 meters, has large polyps whose distal portions are retractile within the thin transparent proximal portions. A number of these forms will, no doubt, prove to be new to science.

It will be seen from the foregoing notes that the shallow coral reefs of the Philippines support an abundant and varied fauna in the families Cornulariidæ, Tubiporidæ, and Xeniidæ. As this has been shown to be the case in Ternate by Kükenthal [40] and Schenk,[41] in the Maldives [42] and the Celebes [43] by Hickson, in New Guinea and the near-by islands by Hickson and Hiles [44] and

[38] *Jena. Zeitschr. f. Naturw.* (1899), 33.

[39] Marine investigations in South Africa (1902), 1, 70.

[40] Alcyonaceen von Ternate, *Abhandl. d. Senckenb. naturf. Ges.* (1896), 23, pt. 1.

[41] Ibid. (1896), 23.

[42] Fauna and geog. Maldive and Laccadive Archipelago, 2, pt. 1.

[43] *Träns. Zool. Soc. London* (1895), 13.

[44] Willey's Zool. Res. (1900), 4, 66.

by Ashworth,[45] and in Zanzibar by Thomson and Henderson [46] and Crossland and May, it was to be expected that such a fauna would be found in the Philippines, where conditions are much the same as in these regions.

It is interesting, in conclusion, to note the striking similarity between the general littoral alcyonarian fauna of the Philippines and a region so distant as Zanzibar. Briefly stated, the most striking similarities are: The presence of *Tubipora* "wherever coral grows," the large number of species of *Lemnalia*,[47] the presence of *Paralemnalia thrysoides* (Ehrbg.) Kükenthal [48] and of a few common species of *Nephthya* and *Lithophytum*, the presence in considerable quantities of *Telesto* and *Coelogorgia*, the abundance of Xeniidæ and Cornulariidæ, and the "great masses of *Sclerophytum*."

[45] Ibid., 68; and *Quart. Journ. Microscop. Sci.* (1899), n. s. 42.

[46] *Proc. Zool. Soc. London* (1906).

[47] A number of species now known to belong to the genus *Lemnalia* were at that time placed in the genus *Lithophytum*.

[48] This species, formerly placed in the genus *Lithophytum*, has been taken by Kükenthal as the type species of his new genus *Paralemnalia*. See Alcyonarien des Roten Meeres, Expedition S. M. Schiff "Pola" in das Rote Meer. *Zool. Ergeb.* (1913), **29**, 1–33 (reprint).

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ON A COLLECTION OF STOMATOPOD CRUSTACEA FROM THE PHILIPPINE ISLANDS

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ONE PLATE

The collection of Stomatopoda sent to me for examination by the zoölogical department, University of the Philippines, is an extremely interesting one. In addition to examples of a species hitherto undescribed, it contains a number of scarce and imperfectly known forms and enables considerable additions to be made to our knowledge of the geographical distribution of some members of the order.

In all, 20 species and 2 varieties of Stomatopoda are now known from the Philippine Islands, namely:

Squilla scorpio Latreille.
Squilla leptosquilla Brooks.
Squilla hieroglyphica Kemp.
Squilla oratoria De Haan.
Squilla oratoria var. *perpensa* Kemp.
Squilla nepa Latreille (Bigelow).
Squilla raphidea Fabricius.
Pseudosquilla ciliata (Fabricius).
Pseudosquilla ornata Miers.
Pseudosquilla megalophthalma Bigelow.
Lysiosquilla maculata (Fabricius).
Lysiosquilla acanthocarpus Miers.
Lysiosquilla multifasciata Wood-Mason.
Lysiosquilla vicina Nobili.
Gonodactylus chiragra (Fabricius).
Gonodactylus chiragra var. *platysoma* Wood-Mason.
Gonodactylus demani Henderson.
Gonodactylus glabrous Brooks.
Gonodactylus proximus sp. nov.
Gonodactylus glaber Lenz.
Gonodactylus glyptocercus Wood-Mason.
Gonodactylus spinosissimus Pfeffer.

All of these species, with the exception of *Squilla leptosquilla* and *oratoria*, sensu stricto, are present in the collection before me. The former was obtained by the Challenger Expedition in the vicinity of the Philippine Islands at a depth of 115 fathoms, while of the latter a single somewhat abnormal specimen, col-

lected in the Philippines by H. J. Veitch, is preserved in the British Museum collection.

For the new species the name *Gonodactylus proximus* is suggested. It belongs to a group of five very closely allied forms, the characters of which I have discussed in some detail. Owing to the kindness of Dr. W. T. Calman I am able to give some further particulars, which I believe will be welcome, regarding the structure of *G. tuberosus*, a species briefly described by Pocock from the China seas.

Of *Squilla hieroglyphica*, represented in the collection by a single example, only one specimen of unknown locality has previously been recorded. *Pseudosquilla megalophthalma* was hitherto known only from the Red Sea and Mauritius and *Gonodactylus spinosissimus* only from the Red Sea, Zanzibar, and off Ceylon. If my identification is correct *Gonodactylus glaber* must also extend far to the east of the localities in which it has previously been found. *Lysiosquilla vicina*, a most interesting species, which like its near relative in California seems to inhabit burrows made by *Balanoglossus*, has hitherto been known only from Nobili's mutilated type specimen taken in the Red Sea. *Lysiosquilla multifasciata*, another scarce form, is represented in the collection by a series of nine specimens which illustrate the manner in which the characteristic pigmentation is developed.

I have to express my best thanks to Dr. R. P. Cowles, of the University of the Philippines, for the opportunity of examining this interesting collection.

STOMATOPODA

Genus SQUILLA Fabricius

Squilla scorpio Latreille.

Squilla scorpio KEMP, Mem. Ind. Mus. (1913), 4, 42, Pl. II, fig. 30.

No. 0-133. Bantayan, Cebu Province, 1909, 2 ♂, 83 mm.

The two individuals are adult males; the carinæ of the last abdominal somite and telson and the bases of the primary teeth of the latter are strongly inflated, while the raptorial claws exhibit the characteristic features of the sex. The specimens seem to have deteriorated somewhat in alcohol, and unlike much older examples in the Indian Museum collection, the black patch on either side of the fifth thoracic somite, mentioned in Latreille's original description, is scarcely visible; the other characters, however, clearly indicate that the specimens must be referred to the typical form and not to the variety *immaculata*.

Squilla hieroglyphica Kemp.

Squilla hieroglyphica KEMP, Mem. Ind. Mus. (1913), **4**, 51, Pl. III, figs. 38–41.

No. 0-341. Herran Street Market, Manila, Luzon, December, 1911, 1 ♀, 48 mm.

This species appears to be very scarce and has hitherto been known only from a single example of unknown origin in the Indian Museum collection.

The specimen from the Philippines differs in some respects from the type, but may undoubtedly be referred to the same species.

The rostrum is about as long as wide, but is much broader apically than in the type, and there are fewer spines on the abdominal carinæ, namely:

Carinæ.	Abdominal somites.
Submedian	6
Intermediate	5, 6
Lateral	5, 6
Marginal	2, 3, 4, 5

On the telson there are traces of a prælateral denticle, and between the primary marginal spines there are 4 submedian denticles, 7 or 8 intermediate, and 1 lateral. As in the type specimen the raptorial claw bears 5 slender teeth, including the terminal one, and there is no trace of the mandibular palp.

The entire surface of the specimen is curiously eroded. This I believe to be due to the action of formalin, and the same cause may also account for the fact that the curious patches of black pigment, found on the telson of the type specimen, are here entirely missing.

Squilla oratoria De Haan var. **perpensa** Kemp.

Squilla oratoria var. *perpensa* KEMP, Mem. Ind. Mus. (1913), **4**, 70, Pl. V, figs. 57–59.

No. 0-100. Manila Bay, Luzon, 1910, 1 ♂, 83 mm. No. 0-341. Herran Street Market, Manila, Luzon, December, 1911, 2 ♂, 1 ♀, 61–62 mm.

Except for the fact that in one specimen the anterior bifurcated portion of the median carina of the carapace is semi-obsolete, the specimens are quite typical of this widely distributed form.

Squilla oratoria, sensu stricto, is apparently restricted to more northern waters, although I have myself examined a single rather aberrant example from the Philippines which is preserved in the British Museum. The variety *perpensa* is recorded from an area ranging from Hongkong and N. Australia to the Persian Gulf.

Squilla nepa Latreille (Bigelow).

Squilla nepa KEMP, Mem. Ind. Mus. (1913), 4, 60, Pl. IV, fig. 49.

No. 0–100. Manila Bay, Luzon, 1910, 2 ♀, 117, 136 mm. No. 0–105. Manila Bay, Luzon, June, 1911, 2 ♀, 142, 147 mm. No. 0–106. Manila Bay, Luzon, December, 1911, 1 ♀, 98 mm. No. 0–118. Divisoria Market, Manila, Luzon (*T. Banguis*), Nov. 22, 1911, 1 ♀, 160 mm. No. 0–120. Divisoria Market, Manila, Luzon (*T. Banguis*), Nov. 10, 1911, 2 ♀, 93, 120 mm. No. 0–121. Herran Street Market, Manila, Luzon, 1911, 1 ♀, 98 mm.

In one specimen (No. 0–100) the arms of the anterior bifurcation of the median carina of the carapace, instead of being separated throughout their length, are joined together in front of the small middorsal pit. Otherwise all the specimens are quite typical.

Squilla raphidea Fabricius.

Squilla raphidea KEMP, Mem. Ind. Mus. (1913), 4, 88, Pl. VII, fig. 77.

No. 0–111. Divisoria Market, Manila, Luzon (*T. Banguis*), Nov. 22, 1911, 1 ♀, 160 mm.

Genus **PSEUDOSQUILLA** Dana

Pseudosquilla ciliata (Fabricius).

Pseudosquilla ciliata KEMP, Mem. Ind. Mus. (1913), 4, 96.

No. 0–313. Port Galera, Mindoro (*Cowles*), April 20, 1912, 1 ♀, 75 mm.

Pseudosquilla ornata Miers.

Pseudosquilla ornata KEMP, Mem. Ind. Mus. (1913), 4, 100.

No. 0–659. Port Galera, Mindoro, 70 fms. (*Cowles*), April 20, 1912, 1 juv., 22 mm.

The specimen is not in good condition. According to the label the color in life was "red with a brown tinge and with cream-colored dots and cream-colored bars transversely on carapace and on telson extending on to uropods." A pair of dark eyespots circumscribed by a paler shade can be detected on the carapace.

Apart from the fact that the rostrum is rather more sharply pointed apically and that the submedian carinæ of the telson are not fully formed, there is no structural difference between this specimen and the examples in the Indian Museum.

Pseudosquilla megalophthalma Bigelow. Plate I, fig. 1.

Pseudosquilla megalophthalma BIGELOW, Proc. U. S. Nat. Mus. (1894), 17, 500; NOBILI, Ann. Sci. Nat. Zool. (9) (1906), 4, 336; KEMP, Mem. Ind. Mus. (1913), 4, 103.

No. 0–654. Port Galera, Mindoro (*Cowles*), June 3, 1912, 1 ♂, 38 mm.

The single specimen of this scarce species agrees closely in structure with Bigelow's detailed description; but as in Nobili's examples from the Red Sea, spines are found at the posterolateral angles of only the last 3 abdominal somites, and there is no additional spine on the sixth somite on the inner side of the large intermediate spine. The external spine of the bifurcate process of the uropods is a trifle longer than the inner, though the difference between the two is not nearly so pronounced as in *P. ornata*. In this respect the specimen agrees with the type; in the examples from the Red Sea the two spines are equal in length.

The eyes are noticeably larger proportionately than in the allied species, and the ocular somite terminates anteriorly in a sharp spine, which is visible between the bases of the eyestalks. The dorsal process of the basal segment of the antennal protopodite is longitudinally channeled above, while the inferior blade of the process (which is T-shaped in section) is not concave in lateral view; the process, in fact, is precisely similar to that found in *P. ornata*.

The lateral truncate margin of the sixth thoracic somite is more definitely sinuous than in *P. ornata* or *P. oculata* and the ≻ - shaped groove on the lateral wall of the first abdominal somite is well defined.

The color, well preserved in the Philippine specimen, is very characteristic (Plate I, fig. 1). In place of the pair of eyespots found on the carapace in *P. ornata, P. oculata,* and *P. oxyrhyncha* there is in the present species a single median spot, black, circular, and circumscribed by pale yellow. The ground color of the specimen is dull maroon brown (probably much brighter in life) with numerous small cream-colored spots faintly circumscribed by dark brown. These spots, which show a tendency toward arrangement in transverse rows, are found in the posterior third of the carapace, on the exposed thoracic somites, and on all the abdominal segments except the last. The posterolateral corner of the fifth abdominal somite is black, the area so colored being separated from the other parts of the somite by a well-defined band of yellow. The posterior edge of the last abdominal somite with the apices of its spines is blackish, and between this border and the brown anterior portion of the somite a narrow yellow band intervenes. The telson is blackish with traces of a transverse yellow band in its middle; the bases of each of the primary teeth are also yellow in color. The uropods are conspicuously banded with yellow.

Pseudosquilla megalophthalma, specimens of which I have not hitherto had an opportunity of examining, belongs to a small group of very closely allied species which are somewhat difficult to determine with any facility. Apart from color, which in this case is very characteristic, *P. megalophthalma* may be distinguished from its allies by the form of the rostrum, the length of the spines forming the bifurcate process of the uropods, and in particular by the presence and position of the first lateral carina of the telson. This carina in *P. megalophthalma* runs to the apex of the lateral tooth of the telson margin, whereas in *P. oculata* it terminates behind the base of the intermediate marginal tooth. In *P. ciliata*, *P. ornata*, and *P. oxyrhyncha*, the other three species comprised in this group, the first lateral carina is wholly absent.

Genus **LYSIOSQUILLA** Dana

Lysiosquilla maculata (Fabricius).

Lysiosquilla maculata KEMP, Mem. Ind. Mus. (1913), 4, 111, Pl. VIII, figs. 86–91.

No. 0–362. No locality given, 1 ♀, 125 mm. No. 0–1108. Taytay, Palawan, "Coll. by natives," May 24, 1913, 1 ♀, 235 mm. No. 0–1109. Taytay, Palawan, "Coll. by natives," June 4, 1913, 1 ♀, 280 mm.

In the two very large females the teeth on the raptorial claws are, as is usual, very short and less numerous than in males. In specimen 0–1108 there are respectively 8 and 9, and in specimen 0–1109, 7 and 9. On these limbs there are tufts of hairs on the carpus and at the base of the propodus.

In the small specimen the left hand claw, as in the male, bears 10 slender teeth including the terminal one, while on the right propodus, which is smaller and appears to have been regenerated, there are only 9 teeth.

In the two individuals in which the color is preserved the dark patch on the telson extends middorsally to the distal margin, isolating an oval, pale area on either side. On the middle of the last abdominal somite there is in one specimen a large transverse pale patch; this segment, as a rule, is wholly pigmented.

Lysiosquilla acanthocarpus Miers.

Lysiosquilla acanthocarpus KEMP, Mem. Ind. Mus. (1913), 4, 120.

No. 0–329. Bantayan, Cebu Province, 1 ♀, 66 mm.

The specimen has been preserved in formalin, and no trace of its original color remains.

Lysiosquilla multifasciata Wood-Mason. Plate I, figs. 2, 3.

Lysiosquilla multifasciata Wood-Mason, Figs. and Desc. of nine Squillidae (1895), 1, Pl. I, figs. 4–7; Kemp, Mem. Ind. Mus. (1913), 4, 122.

Nos. 0–831 and 0–840. Port Galera, Mindoro, "Dug while hunting Balanoglossus near camp." (*Griffin and Wharton*), June 13, 1912, 7 ♂, 2 ♀, 28–56 mm.

This scarce species is represented in the collection by 9 specimens of various ages, which are particularly interesting in that they show the manner in which the dark pigment pattern, which is such a characteristic feature of this and of most other species of *Lysiosquilla,* is developed.

In young specimens, 28 to 32 millimeters in length, there is far less pigment than in adults, that on the exposed thoracic somites being limited to a median patch with a blotch on either side, while on each of the first 5 abdominal somites there are 2 short transverse streaks in the middle and 4 or 5 isolated patches and streaks on either side. On the sixth somite there is a somewhat indefinite transverse patch on either side and on the telson a patch involving the bases of the 2 outer spines of the dorsal series and the lateral marginal teeth (Plate I, fig. 2).

At a later stage, in specimens 40 and 42 millimeters in length, the various patches have almost completely joined, the narrow anterior transverse band of the abdominal somites being, however, distinctly separated from the broader posterior band (Plate I, fig. 3).

The coloring of the adults differs but slightly from that of the type specimen described by Wood-Mason. The amount of pigmentation on the rostrum is decidedly variable, and as a rule, there is in the anterior two thirds of the carapace only a single large indefinite pigmented patch which does not extend to the lateral margins; it is rarely possible to distinguish 2 separate transverse bands in this region. There is always a very heavy transverse border to the posterior margin of the carapace.

On the exposed thoracic somites, in place of the 2 bands found in the type specimen, there is, in adults, only a single band placed posteriorly. Double transverse bands occur on each of the first 5 abdominal somites, the 2 bands being connected middorsally by a suffusion of pigment.

The telson, the coloration of which could not be distinctly made out in the type specimen, exhibits dorsally a single large, semicircular, dark patch extending posteriorly to the base of the marginal teeth and denticles, but in the middle of its distal

edge deeply emarginate, leaving the whole of the base of the middle tooth of the dorsal series pale.

In regard to structural features it may be mentioned that young males invariably possess 6 teeth on the raptorial claw, the posterior one being very small and lying close against the next of the series. In all the other larger specimens there are only 5 teeth. The penultimate tooth is invariably shorter than the antepenultimate, and the large angular lobe at the base of the dactylus on its outer side—one of the most characteristic features of the species—is well shown in all the specimens. In the middle of the distal margin of the telson, between the movable submedian denticles, there are 3 or 4 pairs of spinules.

There are no marked structural distinctions between adult males and females.

Lysiosquilla vicina Nobili. Plate I, figs. 4–8.

Lysiosquilla vicina Nobili, Bull. Mus. Hist. Nat. (1904), **10**, 229; Nobili, Ann Sci. Nat. Zool. (9) (1906), **4**, 339; Kemp, Mem. Ind. Mus. (1913), **4**, 126.

No. 0–840. Port Galera, Mindoro, "Dug while hunting Balanoglossus near camp." (*Griffin and Wharton*), June 13, 1912, 2 ♂, 29 and 32 mm.

In the same bottle with the specimens of *L. multifasciata* were 2 examples of this species, hitherto known only from a single mutilated individual obtained in the Red Sea. These specimens have enabled me to supplement Nobili's account in several particulars and to supply figures of the species.

The rostrum (fig. 5) is one and a half times as broad as long and is remarkable for the fact that it terminates anteriorly in 3 spines, a character found only in one other species of the genus: namely, *L. digueti* Coutière. The median spine extends little beyond those at the lateral angles and fails to reach the cornea of the eye. The anterior margin on either side of the median spine is deeply concave. In dorsal view the spines of the antennular somite are completely concealed by the rostrum.

The eyes are short and rather broad; the cornea is not definitely divided into 2 lobes and is hardly wider than the stalk.

The antennular peduncle extends beyond the eye by the length of its distal segment. The antennal peduncle scarcely reaches the end of the eyestalks. As in *L. multifasciata* and several other species of the genus the antennal protopodite bears on its ventral surface a single soft elongated papilla.

The mandibular palp is composed of 3 segments.

The raptorial claw (fig. 6) somewhat resembles that of *L. tigrina* and is much more slender than that of *L. multifasciata*.

The outer inferior margin of the merus is prominently angulate anteriorly, and the carpus bears a single sharp dorsal spine close to the distal margin; at the base of the pectinate margin of the propodus are 4 comparatively large movable spines. The dactylus is provided with 10 or 11 teeth (usually 10) including the terminal one. Of these the penultimate is equal in length to, or very slightly shorter than, the antepenultimate. The outer margin is evenly convex, and at its base there are 2 small lobes of which the proximal is subacute and the distal bluntly rounded.

In the last 3 thoracic limbs the ultimate segment of the shorter ramus is elongate-oval on the appendage of the eighth somite and almost circular on those of the sixth and seventh.

On its dorsal side the sixth abdominal somite is produced at either posterolateral angle to a stout tooth, and on the inferior aspect there is a slender falcate spine situated anterolaterally on either side and projecting downward, curving round the basal segment of the uropods. There are no ventral spines on the posterior margin of the somite.

The telson (fig. 7) is semicircular in shape and bears a dorsal series of 5 sharp teeth arranged in a curved transverse row. Beyond the outermost of these teeth there is, on each side, a small and inconspicuous tubercle. The posterior margin is armed, as described by Nobili, with 4 large teeth on either side, the lateral much the largest, the remainder more or less equal in size. Immediately beneath each submedian tooth is a large movable denticle, and between the two are 8 pairs (6 pairs in the type specimen according to Nobili) of small spinules, those of each side being arranged in a curved row around the base of the fixed submedian tooth so that the median pair is situated on the same level as that tooth (fig. 8). In the interspaces between the 3 lateral teeth, and on a lower level, a single denticle is to be found, while in front of the lateral tooth there is a prominent angular lobe on the same level as the denticles.

The basal segment of the uropods is prominently keeled externally and bears a sharp dorsal tooth at its posterior angle. Inferiorly the bifurcate process consists of 2 long spines, the outer two thirds the length of the inner; there is also a small spinule over the attachment of the endopod. The proximal segment of the exopod bears 5 or 6 movable spines on its external margin. In the endopod, as is usual in the group to which the species belongs, the anteroexternal margin is folded over and lies firmly pressed against the dorsal surface.

The coloration is distinctive (fig. 4). The rostrum, eyestalks, antennæ, antennular peduncle, and most of the thoracic ap-

pendages are sprinkled with large, black chromatophores. The carapace is similarly pigmented, the pigment spots toward the posterior end showing a tendency toward aggregation into a transverse band. Each of the last 3 thoracic and first 5 abdominal somites bears a narrow posterior band, which in the case of the abdominal somites is sometimes interrupted in the middle. In the median portion of each somite there are also 2 other narrow bands of pigment, distinctly separated in the middle, but always joined laterally. There are thus in this species 3 distinct bands on each somite in place of the 1 or 2 found in allied forms. On the sixth abdominal somite there is a single large, round, dusky patch on either side. On the telson, much as in *L. multifasciata*, a patch of black pigment invests the bases of the 2 outermost pairs of the dorsal series of teeth; the base of the median tooth is pale, and there is also a pale intrusion between the first and second lateral teeth. The uropods are suffused with black pigment at the proximal end of the basal segment, on the endopod, and on the joint between the 2 segments composing the exopod.

Lysiosquilla vicina is very closely allied to *L. digueti* Coutière, from Lower California, and these 2 species may be distinguished from all other members of the genus by the possession of a trispinous rostrum.

Judging from Coutière's account [1] of the American species, the two forms may be separated as follows:

Lysiosquilla vicina Nobili.	*Lysiosquilla digueti* Coutière.
Raptorial claw furnished with 10 or 11 teeth.	Raptorial claw furnished with 8 teeth.
Telson with 6 to 8 pairs of submedian denticles.	Telson with 3 pairs of submedian denticles.
No eyespots on fifth abdominal somite or telson.	A pair of very prominent black spots, pale in the center and circumscribed by a pale band on fifth abdominal somite, and a pair of similar spots partially fused on telson.

Lysiosquilla digueti, like *L. vicina*, inhabits burrows made by *Balanoglossus*, and the only specimen known was found living commensally with a large polynoïd worm in the tubular cavity formed by the genital ridges of the *Balanoglossus*. The stomatopod was found in this curious situation fixed to the back of the polynoïd. The two commensals resembled one another closely in color, the conspicuous patches of pigment on the *Lysiosquilla*

[1] Coutière, *Bull. Soc. philomath.*, Paris (9) (1905), 7, 174.

bearing a striking similarity to those on the elytra of the polynoïd.[2]

Genus GONODACTYLUS Latreille

Gonodactylus chiragra (Fabricius).

Gonodactylus chiragra KEMP, Mem. Ind. Mus. (1913), 4, 155, Pl. IX, fig. 107.

No. 0–338. Port Galera, Mindoro (*Cowles*), March 30, 1912, 1 ♂, 33 mm. (form AD); 1 ♀, 71 mm. (form A). No. 0–347. Bantayan, Cebu Province, 1909, 1 ♂, 110 mm. (form AB); 1 ♀, 91 mm. (form A). No. 0–651. B 30–58. Port Galera, Mindoro, 45 ft. (*Cowles*), April 21, 1912, 1 ♀, 14.5 mm (form H). No. 0–656. Medio Island, Port Galera, Mindoro (*Cowles*), April 4, 1912, 1 ♀, 28 mm. (form H). No. 0–653. D4. Port Galera, Mindoro (*Cowles*), April 11, 1912, 1 ♂, 1 ♀, 13.5 and 18 mm. (form H). No. 0–657. B 51. Port Galera, Mindoro, 10 ft. (*Cowles*), April 20, 1912, 1 ♀, 17 mm. (form H). No. 0–658. C 32. Port Galera, Mindoro (*Seale*), April 11, 1912, 2 juv. 8 and 9 mm. (form H). No. 0–660. A 51. Port Galera, Mindoro, 70 ft. (*Cowles*), April 20, 1912, 1 ♂, 14 mm. (form H). No. 0–661. B 30–58. Port Galera, Mindoro, 45 ft. (*Cowles*), April 21, 1912, 1 ♂, 16 mm. (form H). No. 0–662. West coast of Paniguian Island, Port Galera, Mindoro (*Griffin*), March 30, 1912, 2 ♀, 26 and 31 mm. (form H). No. 0–663. A 51. Port Galera, Mindoro, 70 ft. (*Cowles*), April 20, 1912, 1 ♂, 16 mm. (form H). No. 0–664. A 51. Port Galera, Mindoro, 70 ft., 1 ♂, 16.5 mm. (form H). No. 0–666. Port Galera, Mindoro, 70 ft. (*Cowles*), April 20, 1912, 1 ♀, 28 mm. (form H). No. 0–858. Port Galera, Mindoro (*Cowles*), May 19, 1912, 4 ♂, 2 ♀, 73–89 mm. (form A). No. 0–1035. Taytay, Palawan (*Laki*), April or May, 1913, 2 ♂, 3 ♀, 44–94 mm. (4 form A, 1 form AH). No. 0–1057. Taytay, Palawan (*Cowles*), April 11, 1913, 1 ♀, 65 mm. (form A). No. 0–1061. Taytay, Palawan (*Laki*), April 17, 1913, 1 ♂, 78 mm. (form A). No. 0–1079. Pabellones Island, Palawan (*Laki*), May, 1913, 2 ♀, 18 and 43 mm. (form D). No. 0–1094. Batas Island (*Wharton*), May 15, 1913, 1 ♀, 77 mm. (form A). No. 0–1095. Taytay, Palawan (*Laki*), April 17, 1913, 1 ♂, 77 mm. (form A). No. 0–1096. Taytay, Palawan (*Cowles*), April 21, 1913, 1 ♀, 57 mm. (form D). No. 0–1097. Taytay, Palawan (*Ricardo*), May 23, 1913, 1 ♂, 1 ♀, 77 and 99 mm. (form A). No. 0–1113. Taytay, Palawan (*Laki*), April 20, 1913, 1 ♀, 76 mm. (form A). No. 0–1114. Taytay, Palawan (*Griffin*), April 15, 1913, 1 ♀, 53 mm. (form D).

Examination of the long series of specimens in the collection of the zoölogical department of the University of the Philippines tends to confirm the views which I expressed when giving an account of the material in the Indian Museum: namely, that of all the varieties which have been recognized by distinct names only one, variety *platysoma* Wood-Mason (with which form G = *acutus* Lanchester is apparently synonymous), can be sustained.

All of the specimens listed above, in my opinion, are examples of *Gonodactylus chiragra*, sensu stricto. Under the records of

[2] See Coutière, loc. cit.

occurrence I have endeavored to indicate the form which the telson has assumed in each batch of specimens, using the initial letters given by Borradaile in his key to the "varieties" of the species.[3]

As in the Indian Museum collection, the majority of the larger specimens are to be referred to form A (= *incipiens* Lanchester). There are a few examples of form D (= *smithi* Pocock), while most of the very small individuals, of which there is a large series, represent form H (= *affinis* de Man). In a number of the very smallest examples, somewhat doubtfully referred to this last form, the median carina of the telson is very broad and exhibits on either side near its distal extremity a small dimple or longitudinal depression. This depression appears to become larger in the course of subsequent molts, and in time results in the formation of the short additional carina typical of form H.

In my account of the Indian material I have suggested that the characters of specimens of form H become modified in the course of subsequent molts. Throughout the Stomatopoda there is a tendency for the carinæ of the telson to become blunter with age, and when this is borne in mind it is not difficult to understand how a specimen which started life as form H may, with increased size, take on the characters of form A.

The coloration of the smaller specimens is, in many cases, noted in detail on the labels, and the range of variation in this respect is evidently very great. Most specimens appear to have been spotted or banded with cream on a ground color of red, reddish brown, brown, gray, or yellowish green.

Gonodactylus chiragra var. **platysoma** Wood-Mason.

Gonodactylus chiragra var. *platysoma* KEMP, Mem. Ind. Mus. (1913), 4, 162, text fig.

No. 0–858. Port Galera, Mindoro (*Cowles*), May 19, 1912, 5 ♂, 1 ♀, 72–91 mm. Nos. 0–1011 and 0–1012. Guam, Mariana Islands (*Thompson*), 1913, 1 ♂, 71 mm., 1 ♀, 64 mm. No. 0–1107. Medio Island, Port Galera, Mindoro (*Cowles*), April 20, 1913, 1 ♀, 58 mm.

The specimens agree closely with the examples in the Indian Museum and resemble them in being noticeably broader in proportion than typical examples of the species. In describing the Indian Museum specimens I attempted to demonstrate this difference mathematically, but one of the measurements used on that occasion, namely, the total length including rostrum, is perhaps liable to give somewhat inaccurate results owing to varying degrees of contraction or expansion in the preserved material.

[3] Borradaile, *Trans. Linn. Soc. Zool.* (1907), 12 (2), 211.

In the case of the Philippine examples of this variety, therefore, I have attempted to express this difference in the form of a ratio between the length of the carapace (excluding rostrum) and the breadth of the abdomen at the fourth abdominal somite. The results seem to indicate that the variety is on the average broader than the typical form in the proportion of 6 to 5.

TABLE I.—*Measurements of Gonodactylus chiragra var. platysoma.*

No.	Sex.	Total length.	Length of carapace.	Breadth of fourth abdominal somite.	Ratio of carapace-length to abdomen-breadth.
		mm.	*mm.*	*mm.*	
0-858	♂	91	18.4	17.3	1.06
0-858	♂	84	17.4	16.6	1.05
0-858	♂	84	17.1	16.3	1.05
0-858	♂	81	16.7	16.1	1.04
0-858	♂	72	15.1	14.8	1.02
0-1011	♂	71	15.5	14.2	1.09
0-858	♀	76	16.3	16.2	1.01
0-1012	♀	64	14.0	14.1	0.99
0-1107	♀	58	12.0	12.5	0.96

TABLE II.—*Measurements of Gonodactylus chiragra, sensu stricto.*

No.	Sex.	Total length.	Length of carapace.	Breadth of fourth abdominal somite.	Ratio of carapace-length to abdomen-breadth.
		mm.	*mm.*	*mm.*	
0-347	♂	110	26.8	21.2	1.26
0-858	♂	89	19.2	15.2	1.26
0-1061	♂	78	18.0	14.7	1.22
0-1095	♂	77	16.7	14.0	1.19
0-1097	♂	77	16.2	13.5	1.20
0-858	♂	76	16.5	13.4	1.23
0-858	♂	75	16.5	13.5	1.22
0-858	♂	73	14.3	11.7	1.22
0-1035	♂	48	10.8	8.0	1.35
0-1035	♂	44	10.0	7.7	1.30
0-1097	♀	99	20.1	16.5	1.22
0-1035	♀	94	20.5	17.1	1.20
0-347	♀	91	20.4	16.6	1.23
0-858	♀	83	18.1	14.6	1.24
0-858	♀	81	15.8	13.4	1.18
0-1094	♀	77	18.1	14.9	1.21
0-1113	♀	76	19.1	16.3	1.17
0-1035	♀	73	14.7	12.6	1.17
0-338	♀	71	14.5	11.8	1.23
0-1035	♀	65	13.3	11.0	1.21
0-1057	♀	65	13.6	11.7	1.16
0-1096	♀	57	13.5	11.4	1.18
0-1114	♀	53	12.6	10.0	1.26
0-1079	♀	43	9.0	7.3	1.23

TABLE III.—*Ratio of carapace-length to abdomen-breadth in two varieties of Gonodactylus.*

Variety.	Minimum.	Mean.	Maximum.
G. chiragra s. s.	1.16	1.22	1.35
G. chiragra var. *platysoma*	1.01	1.03	1.09

The other characters of the variety are clearly defined in all the specimens in the collection. The raptorial dactylus is short and is not markedly curved at the apex; the lateral teeth of the telson margin are entirely suppressed, and if classified according to Borradaile's scheme, the specimens would belong to form G, or to a phase intermediate between it and form F.

The dorsal processes of the ophthalmic somite are considerably larger in variety *platysoma* than in typical *G. chiragra*. In the latter the external margins of the processes are parallel,[4] whereas in the former they are posteriorly divergent.

The pair of approximate dark spots on the first abdominal somite is distinct in all specimens of the variety and absent in all examples of *G. chiragra*, sensu stricto, while in most individuals a black patch is conspicuous on either side of the last thoracic somite and posteriorly on the fifth abdominal somite midway between the lateral margin and the middorsal line. Patches of pigment are also frequently visible in the middle of the sixth and seventh thoracic somites.

Gonodactylus demani Henderson.

Gonodactylus demani KEMP, Mem. Ind. Mus. (1913), 4, 164, 198, Pl. IX, figs. 108–111.

No. 0–1088. Taytay, Palawan, from coral (*Cowles and Laki*), April 21, 1913, 3 ♂, 3 ♀, 10–19 mm.

The specimens agree very closely with those which I have examined from the type locality,[5] and like them do not possess setæ on the inner margin of the uropod. The spinules on the telson are not numerous, but are much sharper than is customary; they occur only at the distal ends of the 3 median ridges and on the swollen bases of the marginal teeth.

All the specimens show the characteristic transverse rows of black spots (bright blue in life) on the carapace and abdomen.

Gonodactylus glabrous Brooks.

Gonodactylus glabrous KEMP, Mem. Ind. Mus. (1913), 4, 167.

No. 0–133. Bantayan, Cebu Province, 1909, 1 ♂, 55 mm. No. 0–342. Bantayan, Cebu Province, 1909, 3 ♂, 1 ♀, 39–63 mm. No. 0–665. C 32. Port

[4] See Kemp (1914), Pl. IX, fig. 107. [5] Loc. cit., p. 198.

Galera, Mindoro (*Seale*), April 15, 1912, 1 ♀, 32 mm. No. 0–1088. Taytay, Palawan (*Cowles*), April 21, 1913, 1 juv., 15 mm.

The majority of the above specimens belong to form B, which Borradaile names "var. rotundus." One specimen, however, is of the narrow-keeled type, form A (= var. *ternatensis* de Man), and one, in which the keels of the telson are swollen, but possess prominent terminal spines, is intermediate between the two forms.

Gonodactylus proximus sp. nov. Plate I, figs. 9, 10.

No. 0–652. Port Galera, Mindoro (*Cowles*), 2 ♂, 3 ♀, 12–15 mm.

The carapace is longer than broad, with the posterior margin concave. The anterior margins on either side of the rostrum are straight, but slope strongly backward toward the anterolateral angles, which are subacute and slightly produced (fig. 9). The rostrum is sharply trispinous; the basal portion from which the spines arise is remarkably short, its length being less than one quarter its breadth. The 2 anterolateral spines are strongly curved and but little stouter than the central spine, which reaches at least to the middle of the eyestalks.

The dorsal processes of the ophthalmic somite are visible between the rostral spines (fig. 9). They are small and wing-shaped, with straight anterior margins and a lateral margin that slopes inward posteriorly; the anterolateral corners of the processes reach to a point midway between the median and lateral rostral spines on either side. The eyes are cylindrical and extend a trifle beyond the second segment of the antennular peduncle; the cornea in dorsal view is not wider than the stalk.

The mandibular palp appears to be wholly absent.

The dactylus of the raptorial claws resembles that of *G. nefandus* and is less strongly swollen than in *G. pulchellus;* at its proximal end it is distinctly notched externally.

The lateral margins of the exposed thoracic somites are rounded; the posterolateral angle of the third abdominal somite is rectangular, those of the fourth and fifth somites subacute. Each of the first 4 abdominal somites is grooved close to the lateral margin, and inward from this groove a small dimple or depression is visible; the median portions of the somite are in every case quite smooth. The fifth somite is feebly ridged longitudinally on either side, but in the middle is quite smooth (fig. 10), in this respect differing from the allied species, *G. tuberosus* and *G. trispinosus*. On the last abdominal somite the usual transverse row of 6 large tubercles is distinct.

The telson is almost circular in shape and bears in the anterior

half of its dorsal surface 3 small, high tubercles, which are oval in shape and widely separated from one another (fig. 10). These tubercles are not beset with setæ as in certain allied species. In the middle of the distal margin there is a narrow fissure, cut right through the telson, which extends as far as the level of the lateral dorsal tubercles. On either side of it 4 broad marginal teeth are defined by means of triangular notches in the edge. In this respect the species resembles *G. nefandus* and differs from other forms in which the teeth are separated by narrow and deep fissures similar to the central one. Each marginal tooth bears a small spinule on its inner edge, and there is a series of 7 or 8 still smaller spinules on the inner margin of each submedian tooth.

The basal process of the uropods terminates in 2 spines, the outer more than twice the length of the inner. There are 8 or 9 movable spines on the external margin of the proximal segment of the outer uropod. The inner uropod is normal in shape and bears setæ all around its margin.

This species forms one of a small group of closely allied species which are somewhat difficult to determine with any facility. The related forms are *G. trispinosus* Dana, *G. pulchellus* Miers, *G. tuberosus* Pocock, and *G. nefandus* Kemp. In the form of its rostrum *G. proximus* agrees with the first two of these species; it resembles *G. nefandus* with respect to the incisions in the margin of the telson, and *G. tuberosus* in the development of the dorsal processes of the ophthalmic somite.

The absence of the mandibular palp is unexpected. The palp is present and 2-segmented in all the closely allied forms (except *G. trispinosus*, in which it has not been examined), and from the fact that it is similarly developed in the more distantly related *G. glaber* Lenz, *G. glyptocercus* Wood-Mason, *G. excavatus* Miers, and *G. spinosissimus* Pfeffer it was natural to conclude that the character would be found constant throughout the section to which all these species belong.[6]

The distinctions on which I rely for the discrimination of the 5 closely allied species of the *trispinosus*-group are shown in tabular form on page 185. Of *G. trispinosus* I have seen no specimens; the details given are derived from the excellent figure and description which Borradaile has supplied.[7] *Gonodactylus tuberosus*, another species which I have not been able to examine

[6] See Kemp, loc. cit., p. 146.

[7] *Proc. Zool. Soc. London* (1898), 33, Pl. V, figs. 1, 1*a*. Additional notes on this species recently have been published by Miss Rathbun, *Proc. Zool. Soc. London* (1914), 663, Pl. II, figs. 11, 12.

TABLE IV.—*Distinctive characters of five closely allied species of Gonodactylus.*

	G. trispinosus Dana.	*G. pulchellus* Miers.	*G. proximus* sp. nov.	*G. tuberosus* Pocock.	*G. nefandus* Kemp.
Rostrum	Sharply trispinous; basal portion short and produced anterolaterally to sharp and slender spines.	Sharply trispinous; basal portion short and produced anterolaterally to sharp and slender spines.	Sharply trispinous; basal portion very short and produced anterolaterally to sharp and slender spines.	With basal portion long; its anterolateral angles acute, but not forming spines similar to central one.	With basal portion long; its anterolateral angles acute, but not forming spines similar to central one.
Dorsal processes of ophthalmic somite.	Strongly produced laterally (*vide* Borradaile's fig.).	Strongly produced laterally, nearly reaching lateral rostral spine.	But little produced laterally, external margin reaching midway between central and lateral spines of rostrum.	But little produced laterally, external margin reaching midway between central and lateral spines of rostrum.	Very small and inconspicuous, not produced laterally.
Anterior margin of carapace on either side of rostral base.	Almost straight with a slight backward slope; anterolateral angles not (?) subacute.	Concave; anterolateral angles subacute.	Straight with a strong backward slope; anterolateral angles slightly produced and subacute.	Straight, with a very slight backward slope; anterolateral angles rounded and slightly obtuse.	Straight, not sloping backward; anterolateral angles rectangular.
Mandibular palp	(?)	Two-segmented	Absent	Two-segmented	Two-segmented.
Median portion of fifth abdominal somite.	Longitudinally corrugated.	Quite smooth	Quite smooth	Irregularly rugose, with deeper, subcircular, confluent pits or punctations.	Quite smooth.
Dorsal tubercles of telson.	Not widely separated, clothed with fine setæ.	Not widely separated, clothed with fine setæ.	Widely separated, not clothed with setæ.	Not widely separated, clothed with setæ.	Partially fused proximally, not clothed with setæ.
Lateral fissures in telson margin.	Very narrow and deeply cut, extending fully halfway to lateral dorsal tubercle.	Very narrow and deeply cut, extending fully halfway to lateral dorsal tubercle.	Represented merely by triangular incisions between lateral marginal teeth.	Narrow and deeply cut, extending fully halfway to lateral dorsal tubercle.	Represented merely by triangular incisions between lateral marginal teeth.

13391—2

personally, is only known from Pocock's very brief description.[8] For the information given in the table I am under great obligation to Doctor Calman, who at my request made a special examination of the original specimens preserved in the British Museum. From the combination of characters which it possesses it is evident that *G. tuberosus* is quite distinct from any of the allied species.

Gonodactylus glaber Lenz.

Gonodactylus glaber KEMP, Mem. Ind. Mus. (1913), 4, 182, Pl. X, fig. 121.

No. 0–338. Port Galera, Mindoro (*Cowles*), March 30, 1912, 2 ♀, 24 and 25 mm.

The two specimens differ considerably from the examples in the Indian Museum. The last abdominal somite and telson are fused together, and the groove separating them is wholly invisible. There is, moreover, no trace whatever of the elevations on the sixth somite, while those on the telson are only very slightly raised above the surface.

The differences are so great that I would without hesitation have referred the specimens to a new variety, or even species, had it not been that they are in extremely poor condition and that there is a possibility that the characters noted are due merely to post-mortem changes. The specimens have evidently been preserved in strong formalin, and I am inclined to think that this, while it has greatly softened all the calcareous parts, has caused the hinder end of the body to swell and thus has obliterated to a great extent the sculpture of those parts.

Gonodactylus glaber has hitherto been recorded only from the Andaman Islands, Ceylon, and Zanzibar.

Gonodactylus glyptocercus Wood-Mason.

Gonodactylus glyptocercus KEMP, Mem. Ind. Mus. (1913), 4, 186.

No. 0–338. Port Galera, Mindoro (*Cowles*), March 30, 1912, 1 ♀, 25 mm.

Gonodactylus spinosissimus Pfeffer.

Gonodactylus spinosissimus KEMP, Mem. Ind. Mus. (1913), 4, 191, Pl. X, figs. 124, 125.

No. 0–1088. Taytay, Palawan (*Cowles and Laki*), April 21, 1913, 2 ♀, 31 and 34 mm.

This species has hitherto been recorded only from the Red Sea, Ceylon, and Zanzibar.

[8] *Ann. & Mag. Nat. Hist.* (6) (1893), 11, 476, Pl. XXB, fig. 2.

ILLUSTRATIONS

PLATE I

(Drawings by A. Chowdhary.)

FIG. 1. *Pseudosquilla megalophthalma* Bigelow. Dorsal view of the Philippine specimen. $\times 1\frac{3}{5}$.

FIGS. 2 and 3. *Lysiosquilla multifasciata* Wood-Mason.

2. Dorsal view of a very young specimen, showing the characteristic pigmentation. $\times 1\frac{3}{5}$.

3. Dorsal view of an older specimen, showing a further stage in the development of the pigment-pattern. $\times 1\frac{3}{5}$.

FIGS. 4 to 8. *Lysiosquilla vicina* Nobili.

4. Dorsal view of one of the Philippine specimens. $\times 2$.

5. Rostrum. $\times 4$.

6. Last four segments of raptorial claw. $\times 3\frac{1}{5}$.

7. Last abdominal somite and telson. $\times 3\frac{1}{5}$.

8. Telson seen from below. $\times 6\frac{2}{5}$.

FIGS. 9 and 10. *Gonodactylus proximus* sp. nov.

9. Anterior part of carapace, rostrum, etc., in dorsal view. $\times 5\frac{3}{5}$.

10. Last two abdominal somites, telson, and left uropods. $\times 5\frac{3}{5}$.

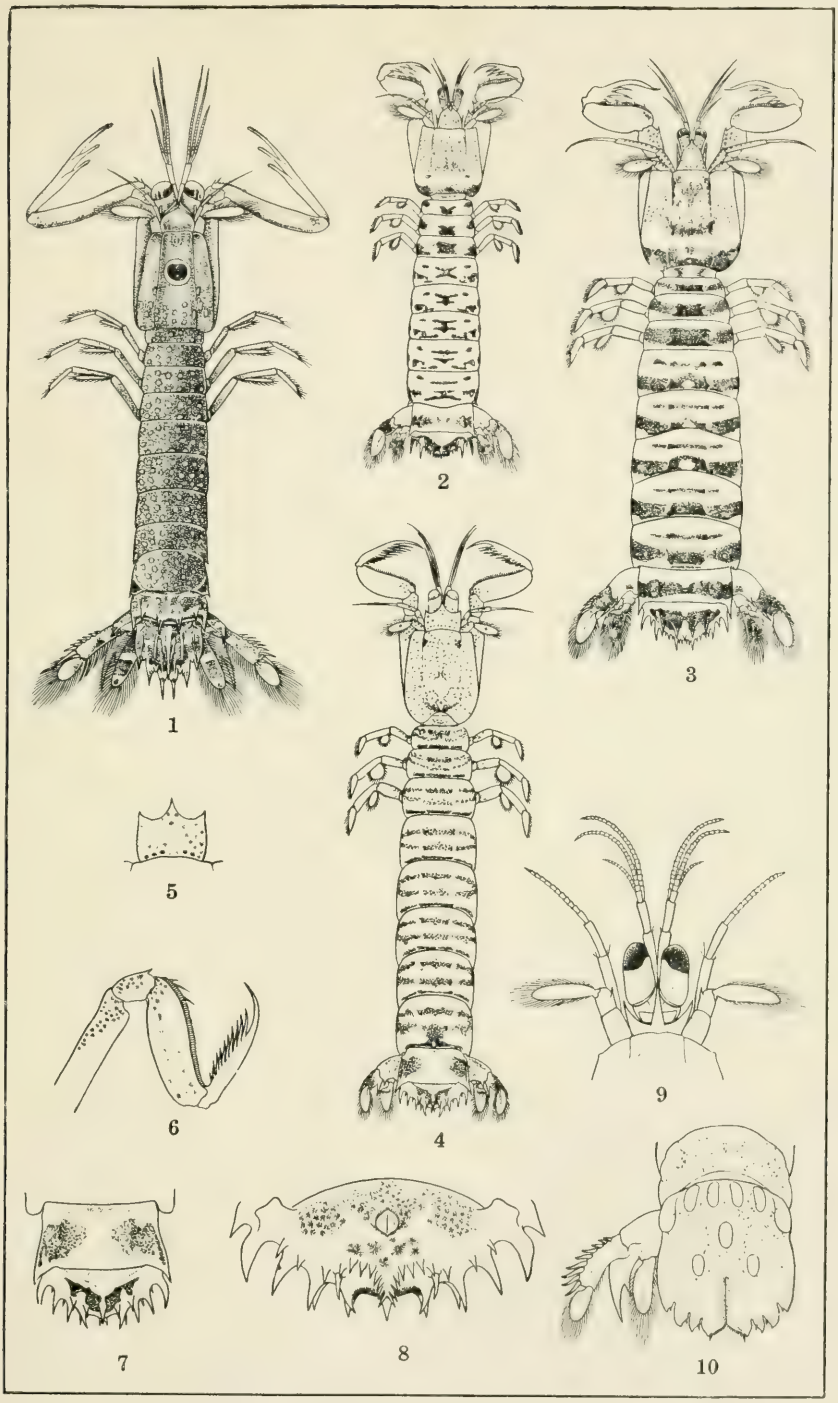

PLATE I. PHILIPPINE STOMATOPOD CRUSTACEA.

STUDIES IN PHILIPPINE JASSOIDEA: III. THE STENOCOTIDÆ OF THE PHILIPPINES

By C. F. Baker

(From the College of Agriculture, University of the Philippines, Los Baños, P. I.)

FOUR TEXT FIGURES

The genus *Signoretia* is as unique among the Jassoidea of the Oriental Region as *Megophthalmus* and *Ulopa* are among those of the Palæarctic Region. The type of the genus, *S. malaya* Stål, from Malacca, was described in 1855, and first placed in the genus *Thamnotettix,* from which Stål removed it in 1858 to a position near *Paropia* (*Megophthalmus*). Atkinson properly followed this suggestion[1] and placed it in the "Subfamily Paropina Fieber," but most authors have appended *Signoretia* to the Tettigoniellidæ, although it is entirely outside of this family in its essential characters. In 1903 Melichar[2] described a new species, *Signoretia gratiosa;* Distant[3] made this the type of a new genus, *Preta,* which has scarcely more than the value of a subgenus. Melichar[4] also described from Ceylon a new genus with one species, *Pythamus dealbatus,* evidently related to *Signoretia.* Distant[5] added two new species to *Signoretia: S. aureola,* from Burma, and *S. greeni,* from Ceylon. Finally, Schmidt[6] added a new species, *S. sumatrana,* from Sumatra.

Similar difficulties have been encountered in the location of the Australian Stenocotinæ, which have usually been appended to the Ledridæ on account of the reduction in armature of the hind tibiæ, although in other characters they show slight relationship to the true Ledridæ. As a matter of fact the armature of the legs in the true ledrids is widely variable and has never been carefully studied nor figured. Single character separations have produced many very unnatural results in the taxonomy of the jassoid insects. Some ancient errors of statement regarding the armature of the posterior tibiæ in certain jassoid groups, that must

[1] Notes on Indian Rhynchota (1885), No. 2, 91.
[2] Homop. Ceylon (1903), 160.
[3] Fauna Brit. Ind.—Rhynch. (1907), 4, 234.
[4] Homop. Ceylon (1907).
[5] Loc. cit.
[6] *Stett. Ent. Zeitg.* (1911), 72, 298.

date from the days of low-power lenses, have been commonly repeated without reëxamination and perpetuated to the present day. Thus *Ulopa* is described as having the posterior tibiæ armed only with soft hairs, whereas under the compound microscope short stout spines are to be found, in distribution very similar to those of *Signoretia*, only smaller. Even Stål said of *Ulopa*, "tibiis posticis inermibus." In spite of the fact that Kirkaldy had dubbed *Ulopa* a membracid, it is very closely related to *Megophthalmus* and the Stenocotinæ, its former separation being very inexact and artificial. A significant indication is the possession by most of these insects of a most remarkable type of sculpturation, consisting of pits, in each of which is a small setigerous tubercle. The structure of the fore margin of the head in *Ulopa* calls to mind *Pythamus* and the Stenocotinæ, a small triangular field indicating a vestige of ocellar sulcus, although the ocelli are apparently absent. The extraordinary tuberculate pitting of the surface would make the identification of ocellar rudiments difficult. Another and unrelated genus, *Aglena*, commonly reported as without ocelli and placed in the Tettigoniellidæ, when examined under the compound microscope exhibits rudiments of ocelli on the extreme anterior margin of the head, and is a true jassid, as its general habitus would suggest. The profound impression of the facial sutures in *Ulopa* gives it a unique appearance, but its front is no more swollen than that of *Signoretia tagalica*. The armature of the hind tibiæ is scarcely different from that of *Signoretia* in anything except size, and the tibiæ are similarly sulcate. It also has the same strong ledges above the antennal scrobes, the superior frontal suture continuous below the margin of the vertex, and the veins of the tegmina basally strongly elevated. Evidently *Ulopa* represents a group very close indeed to the Stenocotidæ as recognized here. The genus *Moonia* of Distant, with some of its relatives, is likewise more closely related to these forms than to the Bythoscopidæ (excluding the eurymelids), where it has been placed.

On the other hand, *Megophthalmus*, the Stenocotinæ, *Signoretia*, *Preta*, and *Pythamus* exhibit a striking similarity in the structure of the head and in the position of the ocelli. The ocelli are set in broad or narrow, more or less profound sulci below the border of the vertex and above the margin of the front. The sculpturation of all these insects is very heavy, consisting largely of very coarse pitting or striation, which usually extends on to the more or less coriaceous tegmina. The vertex of all is more or less excavated or carinate, or occasionally both. The antennæ are seated in deep scrobes beneath a more

or less strongly projecting and usually carinate ledge. In all, the pronotum is more or less strongly rounded between the eyes, and with strong and usually complete lateral carinæ. The pronotum is either normal in form or strongly extended posteriorly and largely covering the scutellum. The venation of the tegmina varies from very simple to most complex. The armature of the hind tibiæ varies from the numerous spines and teeth of *Pythamus* to the few teeth and weak hairs of *Megophthalmus*. In a few of the forms the hind tibiæ are longitudinally sulcate. Among the true Ledridæ, however, can be found as wide variation in tibial armature as in this group. None of these forms possesses the remarkable structure of face common to the true Ledridæ. Much wider variation in structure of head and thorax and in venation of tegmina is to be found in the family Tettigoniellidæ. From all of the evidence available it seems that this group is a natural one, as worthy of distinction in the Jassoidea as are Ledridæ and Tettigoniellidæ, the whole group to be included in one family, the Stenocotidæ.[7] It is true that *Megophthalmus* is only Palæarctic, while the Stenocotinæ are Australasian, but Kirkaldy [8] has described a genus, *Kahavalu*, from Australia, which is very closely related to *Megophthalmus*, if not congeneric with it.

Rearrangement of these groups along more natural lines, and based upon more detailed knowledge, has been delayed, because the older species, often the types of the groups, have remained but little known as to their structural details. The older figures, and some of the later ones, are extremely misleading, and the older descriptions are usually inadequate. For instance, specimens of *Megophthalmus scanicus* Fall, of Sahlberg's collecting, received from Doctor Reuter, cannot be placed in any position under the microscope that will cause the face to appear in the least like the cut in Fieber's "Les Cicadines d'Europe." Sketches from these specimens made with camera lucida are presented herewith (fig. 1). No previously published detail drawings of *Signoretia* are known to me. In fact, even the exact determination of *Signoretia malaya* Stål, the type of the genus, is open

[7] An instance of very unnatural association is Oshanin's reference of the Persian genus *Adelungia* to the family Koebeliidæ, described by me in *Psyche* (1907), 8, 76. *Koebelia* has a ledroid habitus with thin horizontally laminate vertex, but the ocelli are on the face. *Adelungia* has a strikingly bythoscopoid habitus, but the head is provided with a porrect laterally compressed process. The two genera have not the remotest relationship. *Adelungia* pertains to the Bythoscopidæ and should there form a new subfamily, the Adelungiinæ.

[8] *Bull. Rep. Exp. Sta. Hawaiian Sug. Pl. Assoc.* (1906), 1, pt. 9, 371.

to doubt, due to lack of full descriptions and figures. It is not at all certain that the Indian, Malaccan, and Philippine forms referred to this species will turn out to be the same, when studied in detail side by side.

Signoretia has long been recorded from the Philippines, and we can now add *Pythamus*, with a remarkably interesting species.

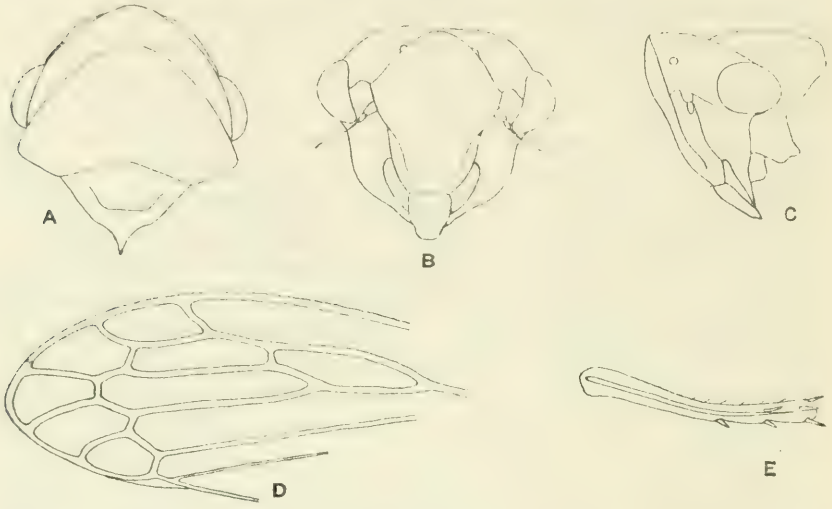

FIG. 1. *Megophthalmus scanicus* Fall. *a*, upper surface of head, pronotum, and scutellum; *b*, face; *c*, lateral view of head and pronotum; *d*, apical half of tegmina; *e*, posterior tibia.

STENOCOTIDÆ

Synopsis of the subfamilies.

a^1. Venation of tegmina complex, usually with numerous supernumerary veins, the apical cells irregular and numerous, and the anteapicals at least 3; pronotum reaching far cephalad of eyes, but normal posteriorly; sculpturing of vertex, pronotum, and scutellum largely a coarse striation; ocellar sulci closed toward the eyes; clavus apparently with a single median vein, although distally sometimes with supernumerary veinlets; "posterior tibiæ quadricarinate, with six strong spiniferous spurs on the outer margin, shortly but strongly spined on the upper margin, and feebly bristled on the others" (Kirkaldy).

Stenocotinæ.

a^2. Venation of tegmina simple, without supernumerary veins, the apical cells 4; sculpturing of vertex, pronotum, and scutellum largely a very coarse puncturation; ocellar sulcus open to eyes.

b^1. Ocelli nearer to median line than to eyes; pronotum extending cephalad of eyes; tegmina with 2 anteapical and 1 basal cell; clavus with 2 longitudinal veins; posterior tibiæ sulcate and with few spines and short hairs..... Megophthalminæ.

b^2. Ocelli nearer to eyes than to median line; pronotum not extending cephalad of eyes; tegmina with 1 anteapical cell or none.

c^1. Pronotum greatly extended caudad, largely covering the scutellum, and strongly convex; head as wide as, or wider than, pronotum; genæ very short; clavus with 2 longitudinal veins, occasionally connate; posterior tibiæ with comparatively few spines and short hairs ..... Signoretiinæ.

c^2. Pronotum normal, shallowly incurved posteriorly, the exposed scutellum large; head distinctly narrower than pronotum, the pronotum not projecting between the eyes to half their length; clavus apparently with a single longitudinal vein; posterior tibiæ with several thick-set rows of spines ..... Pythamiinæ.

STENOCOTINÆ

Synopsis of the genera (after Kirkaldy).

a^1. Scutellum plane.

b^1. Vertex plane ..... Stenocotis Stål.

b^2. Vertex somewhat recurved ..... Smicrocotis Kirk.

a^2. Scutellum cristate ..... Kyphocotis Kirk.

MEGOPHTHALMINÆ

Synopsis of the genera.

a^1. Ocellar sulcus broad.

b^1. Clypeus short, scarcely longer than broad, sides rounded; ocelli above the eyes in facial view..... Megophthalmus Curt.

b^2. Clypeus three times as long as broad, the sides subparallel; ocelli between the eyes in facial view..... Paropulopa Fieb.

a^2. Ocellar sulcus narrow..... Kahavalu Kirk.

SIGNORETIINÆ

Synopsis of the genera.

a^1. Pronotum anteriorly with 2 very short, submedian carinæ; vertex blunt, usually broadly irregularly rounded between the eyes; clavus with 2 complete and distinct longitudinal veins..... Signoretia Stål.

a^2. Pronotum with 2 complete submedian carinæ; vertex long and rather acutely pointed; clavus with the 2 veins apparently medially connate. Preta Dist.

PYTHAMIINÆ

Synopsis of the genera.

a^1. Vertex with a high, laminate, median carina; tegmina with very distinct venation, basally with setigerous tuberculate pits similar to those on pronotum ..... Pythamus Mel.

a^2. Vertex raised toward median line, but not carinate; tegmina subcoriaceous, venation very indistinct..... Tortor Kirk.[9]

[9] This genus is placed here provisionally.

PHILIPPINE REPRESENTATIVES OF THE STENOCOTIDÆ

SIGNORETIINÆ

Genus SIGNORETIA Stål

Signoretia malaya Stål.

Stål, Of. Vet. Ak. Forh. (1855), 192 (*Thamnotettix*).
Stål, Freg. Eug. Resa (1858), 290.
Atkinson, Journ. As. Soc. Bengal (1885), 54, 91.
Distant, Fauna Brit. India—Rhynch. (1907), 4, 232.

Head, most of pronotum and abdomen, except genitalia, stramineous; the following parts virescent: posterior portion of pronotum, clavus at base and extreme apex, 2 inner sectors of corium apically, clypeus, forelegs, middle and hind tibiæ except base, all tarsi, and the genitalia. Tegmina albescent, the veins in apical area fuscescent. Length ♀, 7 mm.

Length of face greater than width across eyes (fig. 2, *b*). Front and clypeus strongly ridged, on former the ridge sharply carinate, surface adjoining ridge depressed, broadly so on upper part of front. Lateral faces of front convex and with about 9 weak, incomplete ridges; surface otherwise only irregularly and very minutely roughened. Facial ridge terminating in central swollen portion of clypeus; apical angles of clypeus depressed and laminate, length of clypeus about half that of front. Temples with a lobular extension of ledge above scrobe extending over the lateral margin of front (hidden in facial view). Ocellar sulcus very narrow at apex of head and continuous except for a minute, blackish median carina, laterally twice suddenly broadened, the ocellus less than its own width from the eyes. Length of vertex more than half its width between the eyes, its plane parallel with the long axis of the body; the profound discal concavity of the vertex medially carinate, the carina brownish anteriorly, the surface of the area minutely tuberculate; the thick basal transverse ridge nearly straight, and with a brownish dot at center, the thin extremities of this ridge obliquely continued to behind eyes.

Pronotum (fig. 2, *a*) about three times the length of vertex; the lateral margin about two and one half times into the width; the marginal carina strong, straight, and complete; pleuræ deeply furrowed and with a short transverse carina at two thirds of the depth. Sculpturing of the pronotum and pleuræ a very coarse and continuous bordered thimble-pitting, at the bottom of each pit a minute setigerous tubercle, exactly the peculiar character of sculpturing found in *Ulopa*, *Megophthalmus*, and *Pythamus*; a strong narrow depression from one lateral angle to the other,

passing one seventh of the length from the anterior border, and following the curve of the anterior margin; submedially this submarginal depression is crossed by 2 short longitudinal carinæ. Exposed portion of scutellum less than one fourth the length of pronotum, and with a curved transverse ridge at center. Veins of tegmina carinately prominent and strongly pit-bordered back of apical cells; basal half of clavus, and basal two thirds of 2

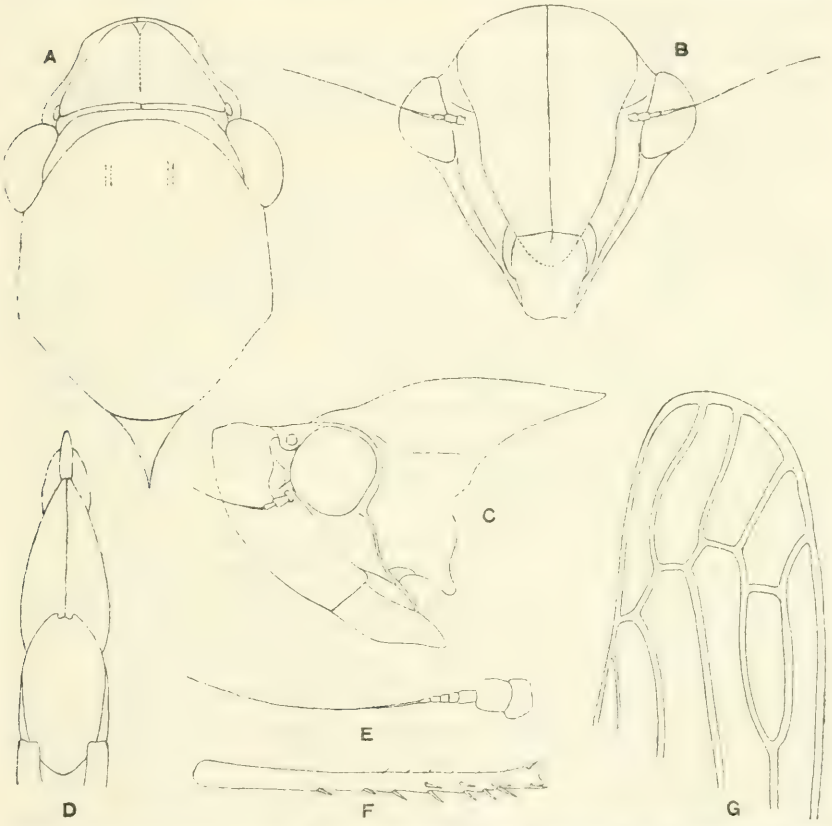

FIG. 2. *Signoretia malaya* Stal. *a*, upper surface of head, pronotum, and scutellum; *b*, face; *c*, side view of head and pronotum; *d*, female genitalia (abnormally extruded); *e*, antenna; *f*, posterior tibia; *g*, apical half of tegmina.

outer areas of corium, thickly thimble-pitted like the pronotum; tegmina entirely without an appendix, but the marginal vein apically very thick; margin of basal cell of clavus three times as long on the commissure as on the anal margin. Genitalia in this specimen unnaturally extruded (fig. 2), but subgenital plate of great length, subelliptical, strongly medially ridged and carinate, and the apex narrowly shallowly sinuate-emarginate. Posterior tibiæ prismatic, shallowly sulcate on one side, the outer borders

spined as shown in fig. 2, *b*, but the inner angle, not shown in figure, with a thick-set row of slender spines.

Apparently rare at Los Baños, Luzon.

As that species has been described, it is only possible to refer our form provisionally to *S. malaya* of Stål, at this time. As stated, there is great need for the more thorough study of the type.

Signoretia tagalica sp. nov.

Stramineous, vertex with 2 transverse submedian brown dots near anterior border and a brown dot above each ocellus; tegmina albescent, with the veins in apical area fuscescent. Length, ♂ 6.5, ♀ 7 mm.

Length of face less than width across eyes (fig. 3, *b*). Front more strongly inflated than in *S. malaya* and smoother, the median carina not extending on to the clypeus. The swollen margin of genæ very broad below, reaching the genæ. Clypeus much more than half the length of the front. Face otherwise, with temples, similar to that of *malaya*. The narrow connection of ocellar sulci in *malaya* is here shallower and less sharply marked; laterally the ocellar area is twice broadened as in *malaya*, but the two subareas are separated by a longitudinal ridge, that in which the ocellus is situated being the deeper; ocellus distant much more than its width from the eye. Length of vertex less than half of its width between the eyes, its plane strongly declivous to the long axis of the body; the distal concavity less profound than in *malaya* and entirely without a median carina, the inner surface finely tuberculate; basal transverse ridge medially distinctly angled, laterally extended to behind eyes.

Pronotum (fig. 3, *a*) more than four times the length of the vertex; the lateral margins contained more than four times in the width; the lateral carinæ less sharp than in *malaya;* pitting shallow, the margins of the pits broad, blunt, and shining, leaving a median, continuous, smooth line which becomes a carina where it crosses the anterior submarginal depression, the submedian carinæ of *malaya* at this point being entirely absent; pleuræ medially irregularly ridged instead of furrowed and without a carina on lower portion. Exposed part of scutellum about one seventh the length of pronotum, surface nearly smooth, centrally slightly umbonate. Tegmina with pitting distributed somewhat as in *malaya*, but far weaker and more irregular, and mostly lacking the setigerous tubercles. Anteapical cell far shorter than in *malaya*. Margin of basal cell of clavus little longer on the commissure than on the anal margin. Subgenital

plate not as long as in *malaya;* broadened apically where the margin projects and is broadly bisinuate. Gonapophyses of male with but few very weak hairs. Posterior tarsi very similar to those of *malaya.*

Described from a male taken on Mount Maquiling, Laguna Province, Luzon, and a female taken on the neighboring mountain mass of Banahao (types in coll. *Baker*).

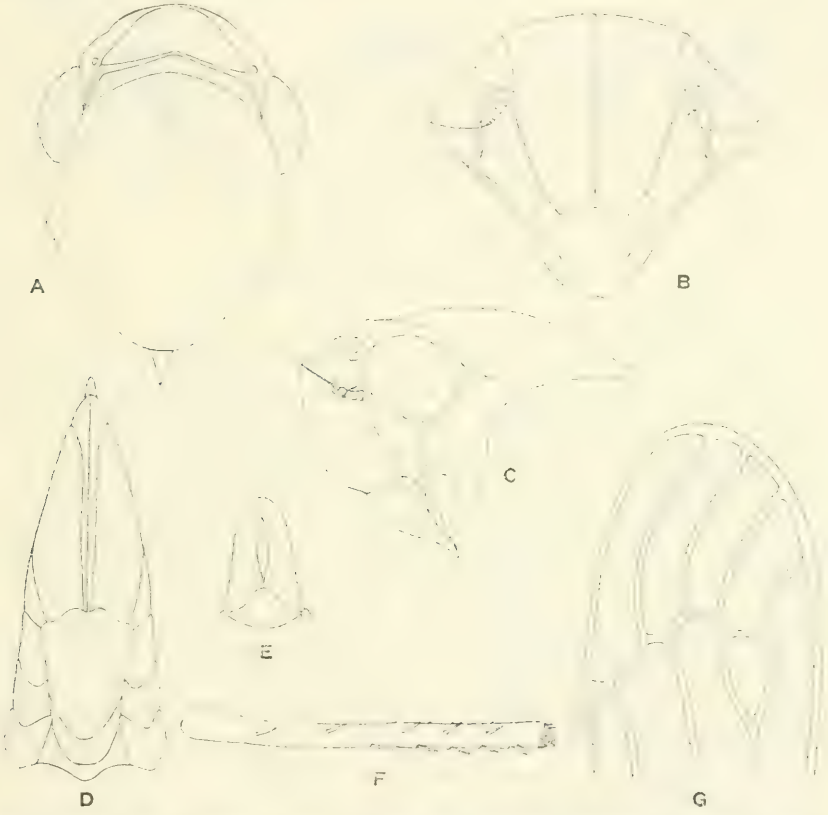

FIG. 3. *Signoretia tagalica* sp. nov. *a*, upper surface of head, pronotum, scutellum; *b*, face; *c*, side view of head and pronotum; *d*, female genitalia; *e*, male genitalia; *f*, posterior tibia; *g*, apical portion of tegmina.

A provisional separation of the above two species from other species of *Signoretia* may be made as follows:

*a*¹. Vertex much longer at middle than at the sides, the length equal to, or more than, one half the width between the eyes.

*b*¹. Head, pronotum, scutellum, and abdomen not black.

*c*¹. Pronotum with 2 very short submedian carinæ on anterior area; lateral margins of the pronotum into the width 2.5 times; body stramineous, above partly and legs virescent; length, 7 mm.

malaya Stål.

c^2. Pronotum medially completely unicarinate; lateral margins of pronotum into its width about three times; body above variously colored with chocolate brown, pale ochraceous, grayish brown, and grayish; length, 7 mm..... greeni Dist.

b^2. Head, pronotum, scutellum, and abdomen black; tegmina dark, smoky brown; length, 7 mm. (Schmidt does not figure his species and does not described the structural details of head, pronotum, and tegmina, merely saying that in these particulars it is like *malaya*). sumatrana Schmidt.

a^2. Vertex but little longer at middle than at sides, the length less than half the width between the eyes.

b^1. Lateral margins of pronotum into its width little more than two times; stramineous, the tegmina golden yellow, apically and basally grayish white; length, 9 mm..... aureola Dist.

b^2. Lateral margins of pronotum into its width more than four times; stramineous, the tegmina albescent; length, 7 mm... tagalica sp. nov.

PYTHAMIINAE

Genus **PYTHAMUS** Melichar

Pythamus melichari sp. nov.

Head yellowish, vertex with a very broad, irregular, transverse black band, a black spot at tip and one at each basal angle. Pronotum shining bronzy black, bluish pruinose laterally, the lateral margin yellowish, this margin shortly angularly extending inwardly at 3 points, once at the posterior lateral angle, once in the middle, and again behind the eyes. The pleura is almost entirely yellowish. Front at upper angles and on either side at antennal scrobes black-dotted. Scutellum black, shining, the lateral margins of posterior area yellowish. Tegmina black on inner half, which is bluish pruinose at base, yellowish on outer half, the veins all blackish and paler distally, distal half of apical area fuliginous. Dorsum black with yellowish lateral margins. All below yellow except apices of pygofers, which are black. In the male the yellows are more intense. Length, ♂ 5.5, ♀ 6.5 mm.

Length of face across eyes nearly once and one half the width (fig. 4, *e*). Front and clypeus shagreened; front not elevated medially, but sharply carinate, the carina not extending on to the clypeus; lateral surfaces of front with subobsolete transverse ridges, the lower half with indistinct submarginal brownish lines at sides. Loræ and genæ obscurely longitudinally rugose, the latter without swollen outer margin. Clypeus somewhat more than the length of front, strongly narrowed apically, the anterior angles not thin and laminate. Ocellar sulci very large and broad triangular, the inner points meeting but separated by a carina, the lower angles extending nearly to antennal scrobes, from whence a curved carina projects from the broken frontal

margin into the disk of this area; the disk of the ocellar area is shallow and coarsely transversely rugose; the ocellus is situated near its upper margin and about halfway between eye and median line of head. The anterior marginal carina of vertex curves to behind the eyes as in *Signoretia*. Length of vertex greater than width between eyes; the median carina is laminately raised to high above the disk, its highest part being on the

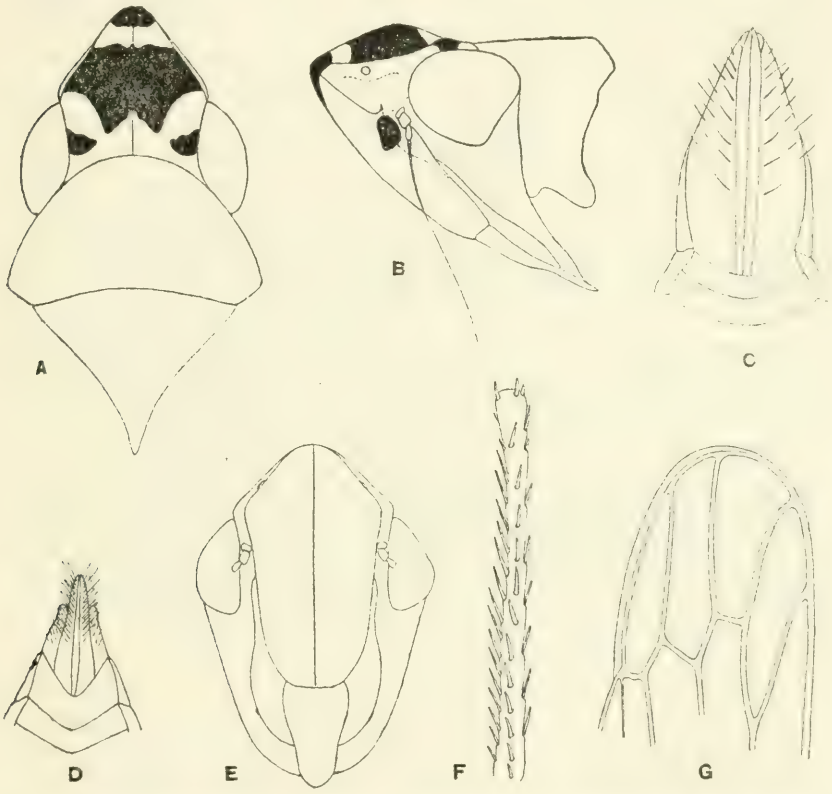

FIG. 4. *Pythamus melichari* sp. nov. *a*, upper surface of head, pronotum, and scutellum; *b*, side view of head and pronotum; *c*, female genitalia; *d*, male genitalia; *e*, face; *f*, posterior tibia; *g*, apical portion of tegmina.

posterior half instead of on the anterior half as figured for *Pythamus dealbatus* Mel.; the disk concave, except on posterior half near the median carina, where it is swollen against the carina, the remaining portion being finely and irregularly wrinkle concentrically to this swollen portion; the position of the basal ridge of *Signoretia* is occupied by a low transverse ridge near the posterior margin.

Pronotum (fig. 4, *a*) broader than head, shorter than vertex,

the posterior margin broadly evenly incurved, fully exposing the large scutellum, the lateral carinæ complete and strongly curved. The pronotum and scutellum, and the tegmina partly, have the same type of large pits as in *Signoretia*, each pit having a setigerous tubercle within, although in this case the pits are more distant and without sharp rims, the surface between them being smooth and shining, but without leaving a smooth median line on the pronotum; disk of pronotum slightly ridged along the median line, anterior area at sides only with narrowed depressions behind the eyes, these depressions occupied by yellow extensions from the lateral margins. The scutellum longer than wide and longer than the pronotum, posteriorly with a strongly impressed transverse line. Tegmina with veins less prominent than in *Signoretia*, all pit-margined, distally more weakly so; basal half of clavus and corium within at base sparingly pitted. In all the present material the fourth apical cell is confluent with the single anteapical cell. The subgenital plate (fig. 4, *c*) of the female is tranverse, truncate posteriorly, and about twice the length of preceding (strongly bent downward in the figure). The subgenital plate of male is of similar form, the gonapophyses are long, narrow, and heavily spined, the lateral plates without curved tips and weakly haired. The hind tibiæ are prismatic and heavily spined as shown in fig. 4, *f*, although still another row of spines exists on the opposite side.

This species is described from several specimens taken at Puerto Princesa, Palawan Island, P. I., and is named for Dr. L. Melichar, author of many monumental works on the Homoptera. (Types in coll. *Baker*.)

Pythamus melichari var. **mindanaensis** var. nov.

A single male specimen from Iligan, Mindanao, is very similar to the type of *P. melichari* in general form and coloration, but differs in several secondary details. The loræ are entirely black, whereas in the type the inner margin only is faintly brown. The propleuræ are entirely black, and the yellow on the pronotal margins is greatly reduced and without inward extensions. The yellow of the tegmina is also reduced, and a greater portion of the apical area is fuliginous. The genitalia also appear to differ slightly, the gonapophyses being longer and the side plates with tips appressed. On superficial examination this specimen would not be distinguished from the species.

ILLUSTRATIONS

TEXT FIGURES

FIG. 1. *Megophthalmus scanicus* Fall.
a, upper surface of head, pronotum, and scutellum; *b*, face; *c*, lateral view of head and pronotum; *d*, apical half of tegmina; *e*, posterior tibia.
2. *Signoretia malaya* Stål.
a, upper surface of head, pronotum, and scutellum; *b*, face; *c*, side view of head and pronotum; *d*, female genitalia (abnormally extruded); *e*, antenna; *f*, posterior tibia; *g*, apical half of tegmina.
3. *Signoretia tagalica* sp. nov.
a, upper surface of head, pronotum, and scutellum; *b*, face; *c*, side view of head and pronotum; *d*, female genitalia; *e*, male genitalia; *f*, posterior tibia; *g*, apical portion of tegmina.
4. *Pythamus melichari* sp. nov.
a, upper surface of head, pronotum, and scutellum; *b*, side view of head and pronotum; *c*, female genitalia; *d*, male genitalia; *e*, face; *f*, posterior tibia; *g*, apical portion of tegmina.

NOTES ON PHILIPPINE ALCYONARIA

PART V: CORNULARIA MINUTA, A NEW SPECIES

By S. F. Light

(From the Zoölogical Laboratory, College of Liberal Arts, University of the Philippines)

SEVEN TEXT FIGURES

Cornularia minuta sp. nov. Figs. 1–7.

Specific characters.—The very minute colonies are attached to the surface of support by the creeping, anastomosing, threadlike stolons. The polyps arise from the stolons at irregular intervals, and when fully expanded have a maximum length of about 2.5 millimeters, including the tentacles, and a minimum diameter of from 0.3 to 0.4 millimeter just below the tentacles. Each polyp is connected with one or more stolons, each of which contains two or more endodermal canals lying in a thick homogeneous mesoglœa. These stolons are covered with a very thin, wrinkled, perisarclike, horny envelope, an extension of which forms a cuplike covering for the basal portion of the polyps. The expanded polyps are slender, and the tentacles are about one third as long as the body of the polyp and bear on either side a single row of from 6 to 10 rather short, thick, cylindrical pinnules. When contracted, the distal portion of the polyp is retracted within the basal, horny covering, which is then cone-shaped or beehivelike. There are no spicules.

Color.—The polyps are dirty white to light yellow and more or less transparent. The perisarc of the basal portion of the polyps is dirty yellow or light brown and has a granular or corrugated appearance due to the wrinkles in its surface and to the particles of foreign matter attached to it. The stolons are white to light yellow and somewhat transparent.

Type.—No. C. 2457, zoölogical collection of the University of the Philippines; Legaspi Bay, Albay Province, Luzon, P. I.; January.

The specimens were found growing on colonies of *Siphonogorgia variabilis* Hickson from the cable in Legaspi Bay in 90 meters of water.

Systematic position.—It has been no easy matter to determine the systematic position of this alcyonarian. Its characters show

FIG. 1. Part of a colony of *Cornularia minuta* sp. nov. Actual size.

a relationship to both *Cornularia* and *Clavularia*. Its external characters are those of *Cornularia;* that is, there are no spicules, the stolons and the proximal portions of the polyp are covered with a horny envelope within which the distal portion of the polyp is retractile, and the polyps are connected by very slender cylindrical stolons. Here the similarity ceases, and the other characters are those of *Clavularia*. The stolons contain a number of endodermal canals instead of one as in *Cornularia*. These are surrounded by a very thick mesoglœa instead of the thin lamella of *Cornularia;* the polyps have a general form more like *Clavularia* than *Cornularia*, as they taper from the base to the distal end, while in *Cornularia* the basal portion of the polyp has the least diameter; the polyp in retraction has the form characteristic of *Clavularia*—that is, the distal portion is retracted within the proximal portion; and finally the perisarc, while distinct and always present, is extremely thin and might be considered as either disappearing or as being a recently acquired character. The external characters, however, are exactly those on which the generic definition of *Cornularia* is based, and we are confronted with the necessity of founding a new genus intermediate between *Cornularia* and *Clavularia* to receive the new species, or of placing it in the genus *Clavularia* in spite of the fact that in external characters it agrees with the definition of *Cornularia*, or of placing it in *Cornularia* in spite of the fact that it agrees with *Clavularia* in certain of its characters. Now that the family Cornularidæ, after much confusion and wasted effort, has been reduced to a few well-defined genera, it seems unwise to introduce new genera unless absolutely necessary. The genus *Cornularia* as now constituted contains only one or perhaps two species, and the addition of this new species should not lead to confusion even though it is atypical in some of its characters. Of course, it is out of the question to add to the already large genus *Clavularia* a form which differs so distinctly from all the known species of that genus. For these reasons I have decided to consider the species under discussion as an atypical species of the genus *Cornularia*, forming a connecting link between it and the genus *Clavularia*.

FIG. 2. A partially retracted polyp of *Cornularia minuta*, showing the wrinkled perisarclike covering of the basal portion. Much enlarged.

As I have stated above, the genus *Cornularia* has contained until the present time but one well-

known species, *C. cornucopiæ* (Pallas) Schweigger, first described by Pallas (1766) as *Tubularia cornucopiæ*. This form is common in the Mediterranean and has been carefully described and figured by Cavolini (1785) and von Koch (1890). Busk (1867) named a new species, from Australia, *Cornularia australis*, basing the separation of the species on the smoothness of the horny covering of the polyps and on the difference in color. These seem to be rather slight grounds for establishing a new species, but we have the statement of so excellent an observer as Allman (Busk 1867), who was familiar with *Cornularia cornucopiæ* of the Mediterranean, that *C. australis* is specifically distinct, and the fact that the habitats of the species are widely separated is further justification for retaining Busk's species. The identity of the species of *Cornularia* named by Kent (1893), of which he gives figures but only very general descriptions, must remain in doubt. Before even their generic position can be definitely stated, we must know whether or not they have spicules, whether or not there is an outer horny envelope, and whether or not the polyps are retractile, and if retractile whether they are entirely retractile or whether they have a distal moiety retractile within a proximal moiety. None of these facts are given by Kent. His *C. parva* and *C. glauca* appear to be species of the genus *Anthelia* of the same general form as Dana's *Rhizoxenia primula*, supposing that form to have had connecting stolons. His *C. tubiporoides* has all the appearance of a species of *Clavularia*, somewhat similar, except in the length of the tentacles, to *Clavularia violacea* Quoy and Gaimard (1834). His *C. auricula* is very difficult to place. If it has, as Kent (1893) says, smooth tentacles without any pinnules whatsoever, it may belong to a new group of Alcyonaria as yet unnamed.[1] *Cornularia crassa* Milne-Edwards, according to Sars (1857) and Müller (1910), is the same as *Evagora rosea* Philippi (1842) = *Rhizoxenia rosea* Dana (1846). The species of *Cornularia* described by Quoy and Gaimard belong to other genera.

Whatever the systematic position of these doubtful forms may be, they show no resemblance to *Cornularia minuta*. The minute size, the very thin, perisarclike, horny envelope, the presence in the stolons of a thick homogeneous mesoglœa pierced by several endodermal canals, and the broadly cone-shaped form of its contracted polyps mark *Cornularia minuta* as a very distinctly new species.

[1] I have been unable to find any pinnules in *Clavularia violacea* Quoy and Gaimard.

Because of its interesting systematic position *Cornularia minuta* is worthy of careful anatomical study. However, my material is so limited in amount and so poorly preserved that I have found it impossible to make a thorough or detailed investigation of the anatomy. The few observations recorded here were made on specimens preserved in formalin.

The extremely thin, horny envelope contrasts strongly with that figured and described by von Koch (1890) and Cavolini (1785) for *C. cornucopiæ;* it averages 0.0008 millimeter in thickness on the stolons and 0.001 millimeter in thickness on the base of the polyps. It is wrinkled throughout, and although closely applied to the ectoderm in some regions, it is as a rule separated from it by a considerable space (fig. 3 *a*). On the stolons the envelope appears smooth and transparent in surface view, but sections show that it is wrinkled. On the basal portion of the polyp the envelope is rather opaque and in surface view has a rough, corrugated appearance (fig. 2), which sections show to be due to wrinkling and to the presence of foreign particles rather than to inequalities in thickness.

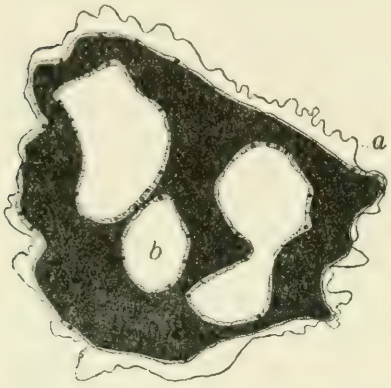

FIG. 3. A cross section of one of the stolons of *Cornularia minuta*, showing the perisarc (*a*), the endodermal canals (*b*), and the thick mesoglœa. From camera lucida outlines. ×202.5.

As von Koch says (1890), in speaking of *C. cornucopiæ*, this skeleton is a product of the ectoderm, similar in origin, appearance, and function to the perisarc of hydroids and of *Scyphistoma*. In *C. minuta* it has a remarkable resemblance, particularly in sections, to the perisarc of certain hydroids; indeed there seems to be no valid objection to the application of the term perisarc to the horny outer covering of the species of *Cornularia*, and I have so used the term in this article.

The thin cup of perisarc within which the polyp retracts is very flexible, as may be seen by a comparison of its shape in the expanded polyp, where its distal and proximal widths are approximately equal (fig. 4), and in contracted polyps where it is nearly closed distally and considerably broadened basally (fig. 2). This is in striking contrast to the condition in *C. cornucopiæ*, where it is thick and stiff, especially at the distal edge of the cup.

Cornularia minuta is smaller in every way than *C. cornucopiæ;* the polyps of the latter are 10 millimeters or more in length, while those of *C. minuta* when fully expanded are but from 2 to 2.5 millimeters in length from the base to the tip of the extended tentacles. These polyps are fully mature, as they were found in several cases to contain well-developed eggs. When expanded they are slender and taper slightly from the base to a region immediately below the tentacles. The tentacles are one third as long as the body of the polyp and form a crown, wide in proportion to the diameter of the polyp. This is in contrast to the condition in *C. cornucopiæ* and gives an appearance

FIG. 4. Camera lucida outline of an expanded polyp of *Cornularia minuta*. ×23.5.

similar to that of the polyps of certain species of *Anthelia*. The pinnules are short, thick, cylindrical, and crowded on the tentacles, and show a superficial segmentation suggestive of hydroid tentacles. They differ decidedly from those of *C. cornucopiæ* as figured by Cavolini (1785), which are long, slender, and rather widely separated on the tentacles, suggesting the arrangement in *Stereosoma* (*Anthelia*) *celebense* Hickson (1895). This difference may be due to some extent to the contraction of the pinnules and tentacles of *C. minuta*. The oral surface shows a raised zone around a large mouth similar to that figured by Cavolini (1785) for *C. cornucopiæ*.

In contraction the entire polyp lies within the cup of perisarc

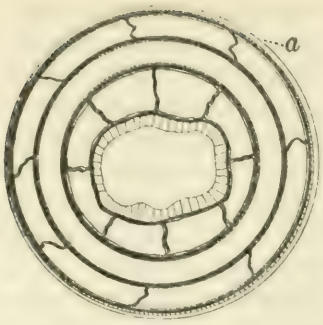

FIG. 5. A schematic representation of a transverse section through a retracted polyp of *Cornularia minuta* to show the relative positions of the body layers. *a*, the perisarc. The ectoderm is cross-lined, the mesogloea is in black, and the endoderm is represented by a line. (Siphonoglyphe not indicated.)

surrounding its base. This is from one third to one half as long as the body of the extended polyp, and in contraction has the shape of a truncated cone or an old-fashioned beehive, the distal aperture being nearly closed and the base considerably broadened. The retraction of the polyps is accomplished as in *Clavularia*, by the pushing in of the distal portion, so that a transverse section of such a polyp taken so as to cut through the stomodæum near the mouth would cut the body wall three times as indicated in fig. 5. In retracted polyps the strongly muscled tentacles are tightly contracted and form an irregularly arranged mass over the oral surface and are not invaginated as figured by von Koch (1890) for *Rhizoxenia* (*Evagora*) *rosea* and by Quoy and Gaimard (1834) for *Clavularia violacea*.[2] The stomodæum in contracted polyps ends near the floor of the body cavity, and the mesenteries and mesenterial filaments are crowded together in its lower portion.

The ectoderm of the body wall and of the stolons is thin and rather irregular, often consisting of a single layer of flat cells so thin that the nuclei form protuberances in the layer. On the tentacles it is thicker, being a number of cells in depth, and it contains in many places large numbers of very curious oval bodies (fig. 7) consisting of an outer rounded or oval capsule containing

FIG. 6. A drawing, from camera lucida outlines, of part of an oblique, transverse section through a contracted polyp of *Cornularia minuta*. *a*, the point of junction of the body cavity and one of the stolons; *a'*, an oblique section through one of the endodermal canals of the stolon; *b*, the perisarc; *c*, the wall of the polyp, represented in black; *d*, the stomodæum; *e*, the siphonoglyphe; *f* and *f'*, mesenteries. ×65.5.

[2] I fail to find this invagination in Philippine specimens of *Clavularia violacea*. Notes on Philippine Alcyonaria, Pt. IV. *This Journal, Sec. A* (1915), **10**, 155.

a spherical nonstaining body and a half-moon-shaped, darkly staining body—apparently a nucleus. The fact that these bodies are found in the ectoderm and that these Alcyonaria came from a depth of 90 meters makes it improbable that we have here a form of unicellular algæ related to those so common in the endoderm of all shallow-water Philippine Alcyonaria. The clear spherical area, however, is strikingly like that surrounding the chromatophore in Zoöxanthellæ, but there is no central staining area as in these algæ. A test for starch would very likely show whether these are algæ or not, but unfortunately I have no material to spare for such a test. They may be differentiated ectoderm cells containing nematocysts of some peculiar type, the dark-staining body being the nucleus of the ectoderm cell. The nuclei of the typical ectoderm cells are quite distinct (fig. 7), however, and the clear spherule shows none of the structure characteristic of nematocysts. Again they may be some protozoan parasite or symbiote, the clear area being a vacuole. Here and there in the ectoderm of the tentacles are enlarged cells completely filled with small, deeply staining, rounded bodies which may be another stage in the life cycle of such a parasite. Because of lack of material the determination of the exact nature of these very curious and interesting little bodies must be left to some future investigator.

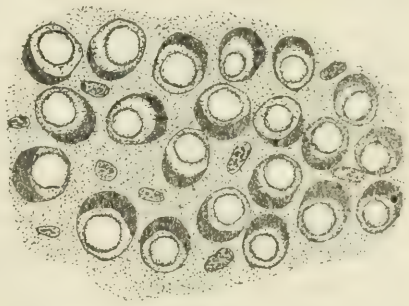

FIG. 7. An oblique section through the ectoderm of a tentacle of *Cornularia minuta*, showing the ectoderm nuclei and the peculiar bodies found in the ectoderm cells. × 13.40.

As would be expected in so contractile a form as *C. minuta*, the musculature is heavy. The ectoderm of the tentacles is penetrated by numerous "muscle banners," which are very conspicuous in sections of the contracted polyp. The thick ectoderm of the oral surface also overlies a layer of muscle fibers.

The mesoglœa, which is everywhere a homogeneous mass showing no penetrating rods of cells as in *Xenia* and other genera, nor scattered amœboid cells as in *Capnella, Lemnalia, Lithophytum*, etc., is outlined by an outer and inner deeply staining line. In the body wall the mesoglœal layer averages 0.004 millimeter in thickness, which is about the average thickness of the ectoderm and of the endoderm of the same region. On the oral surface and in the tentacles it is much thickened and sends out

great numbers of supporting lamellæ for muscle attachment. In the tentacles of contracted specimens its edges are complexly folded.

The stomodæum, which is about one third as long as the body of the extended polyp, is lined with the characteristic ciliated columnar epithelium. Scattered among these cells are numbers of goblet-shaped gland cells, making it probable that the stomodæum has in *C. minuta*, as in *Xenia* (Ashworth, 1899), a digestive function. The siphonoglyphe is distinct and separated from the rest of the stomodæum by two deep grooves. It extends with little change from the mouth to the proximal end of the stomodæum. The prominence of the siphonoglyphe in so small a form is not in accord with Hickson's theory (1883) as to the proportion between the development of the siphonoglyphe and the extent of the cavity supplied by a single polyp. The cells of the siphonoglyphe are long and very narrow with deeply staining elongated nuclei and basal portions and lightly staining outer areas. The cilia reach a length of 0.04 millimeter.

The endoderm of the body like the ectoderm consists of a thin layer, usually one cell thick, of flat broad cells. In the tentacles the layer is thicker, and the cells are of the myoepithelial type (Hickson, 1895).

The mesenteries have the structure typical for most Alcyonaria. The retractor muscles are strongly developed as would be expected in so contractile a form. The ventral mesenterial filaments lack the central groove, but are otherwise typical and have cells which resemble very closely those of the siphonoglyphe.

The stolons average about 0.25 millimeter in diameter and lie within the thin, wrinkled, loosely attached envelope of perisarc. They consist of a thick, homogeneous mesoglœa covered by a thin, irregular layer of ectoderm, usually one cell deep. This mesoglœa is pierced by from two to four endodermal canals lined with a smooth layer of thin, flat endoderm, one cell deep (fig. 3). As I have noted before, this type of structure agrees with that found in the stolons of those species of *Clavularia* having filiform stolons and is quite different from that of *Cornularia cornucopiæ*.

A number of eggs which seem to be fairly mature were found in the sections. They were attached to the mesenteries near the bottom of the body cavity and are as usual covered with a layer of mesoglœa and endoderm. The eggs measure 0.04 millimeter in length, and 0.03 millimeter in breadth. The nucleus is large, averaging 0.022 millimeter in length and 0.016 millimeter in breadth. It contains a number of deeply staining

structureless spheres. The cytoplasm is finely reticulated. This specimen was collected early in January, and hence its breeding season, if definite, is probably during January and February.

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ILLUSTRATIONS

TEXT FIGURES

FIG. 1. Part of a colony of *Cornularia minuta* sp. nov. Actual size.

2. A partially retracted polyp of *Cornularia minuta*, showing the wrinkled perisarclike covering of the basal portion. Much enlarged.

3. A cross section of one of the stolons of *Cornularia minuta*, showing the perisarc (*a*), the endodermal canals (*b*), and the thick mesoglœa. From camera lucida outlines. ×202.5.

4. Camera lucida outline of an expanded polyp of *Cornularia minuta*. ×23.5.

5. A schematic representation of a transverse section through a retracted polyp of *Cornularia minuta* to show the relative positions of the body layers. *a*, the perisarc. The ectoderm is cross-lined, the mesoglœa is in black, and the endoderm is represented by a line. (Siphonoglyphe not indicated.)

6. A drawing, from camera lucida outlines, of part of an oblique, transverse section through a contracted polyp of *Cornularia minuta*. *a*, the point of junction of the body cavity and one of the stolons; *a'*, an oblique section through one of the endodermal canals of the stolon; *b*, the perisarc; *c*, the wall of the polyp, represented in black; *d*, the stomodæum; *e*, the siphonoglyphe; *f* and *f'*, mesenteries. ×65.5.

7. An oblique section through the ectoderm of a tentacle of *Cornularia minuta*, showing the ectoderm nuclei and the peculiar bodies found in the ectoderm cells. ×13.40.

NOTE REGARDING THE DUGONG IN THE PHILIPPINE ISLANDS

By Alvin Seale

(*From the Section of Ichthyology, Biological Laboratory, Bureau of Science, Manila, P. I.*)

ONE PLATE

On August 8, 1913, Capt. Edward R. Nicholson, of the Philippine Constabulary, brought to the Bureau of Science a pair of large tusks and some photographs of the Philippine dugong, *Dugong dugong* Müller (Plate I). The animal photographed was caught by fishermen on Magalaua Island, near the town of Palauig, Zambales Province, Luzon, in June, 1913.

Captain Nicholson states that the flesh of the dugong is highly valued as food by the people of Zambales. The tusks, which Captain Nicholson kindly presented to the Bureau of Science, are of smooth hard ivory, slightly curved, and somewhat flattened on the inner surface; length, 164 millimeters; circumference at base, 93 millimeters. Captain Nicholson stated that these tusks were hidden in the skull and scarcely protruded into the mouth. This specimen was a female about 2 meters in length. It is believed that the dugong arrives on the coast of Zambales during May and remains for about one month.

Being desirous of finding out more about the habits of these animals, and of securing a living specimen for the Bureau of Science acquarium, I wrote to the senior inspector of constabulary at Iba and received the following reply:

Iba, Zambales, *December 24, 1913.*

Sir: In answer to a communication from your office dated August 8th and addressed to Captain Nicholson, I have the honor to state that I visited, about two months ago, the Island of Magalaua, situated near the town of Palauig, this province, and where most of the sea cows are caught. I could, however, make no definite arrangements about catching one or two of their young. The people thought it might be done, but said it would be difficult, as the animals—the young—were large and did not live as long as an ordinary fish in the open air. They would set no price on the undertaking, but said they would have a meeting and let me know. Up to date nothing has been heard.

They could tell me very little about the habits of the animals, but thought they give birth along this coast. Said their eyes would undergo a transformation as soon as they enter the open air, but supposed the vision would return when they were put back into the water, if alive. They claim that the eye apparently turns, instantly, to flesh when exposed to the open air.

They are usually caught during the rainy season of the year.

Very respectfully,

John L. F. Tharp.

ILLUSTRATION

PLATE I

FIG. 1. *Dugong dugong* Müller, a female on the beach.
2. *Dugong dugong* Müller, showing head and fore part of body.
3. Tusks of *Dugong dugong* Müller.

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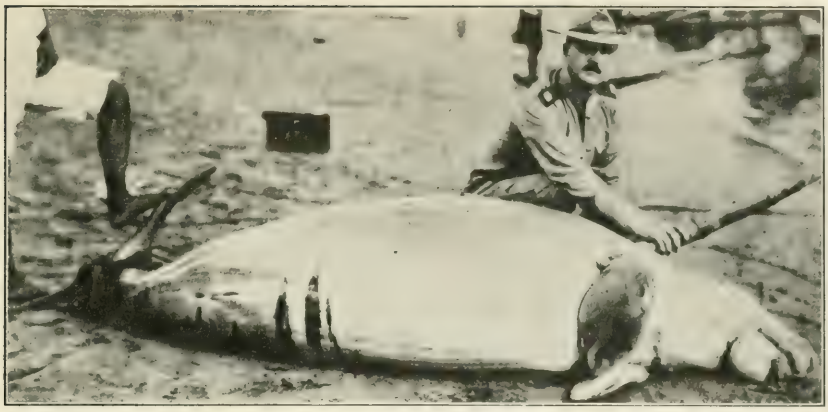

Fig. 1. A female dugong on the beach.

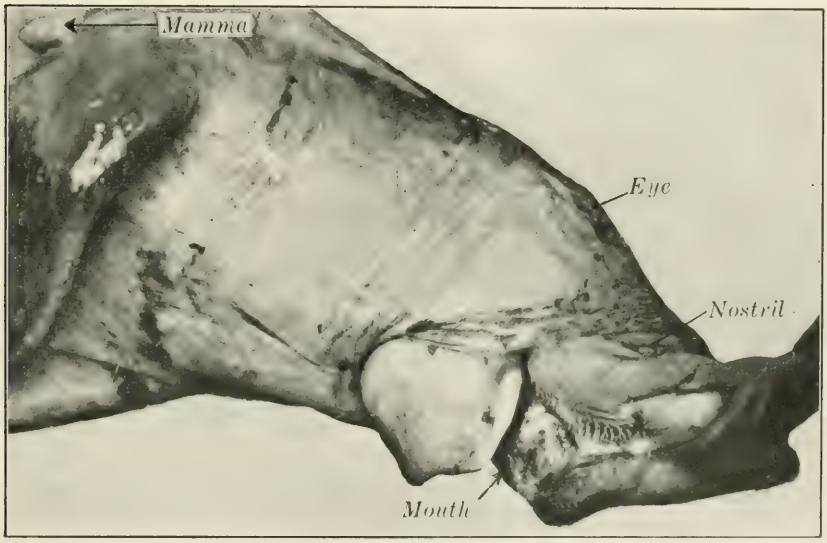

Fig. 2. Head and fore part of body of a dugong.

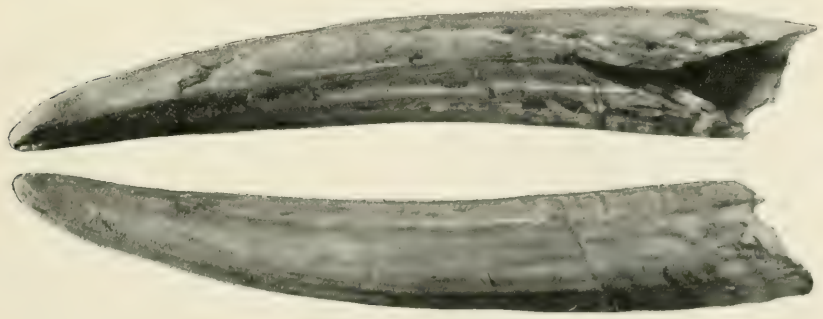

Fig. 3. The tusks of a dugong.

PLATE I.

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NEUE KÄFER VON DEN PHILIPPINEN: III

VON K. M. HELLER
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MIT EINER TAFEL

Der vorliegende faunistische Beitrag befasst sich mit der Beschreibung nur von Rüssel- und Bockkäfern, die mir, wo nicht ausdrücklich anders erwähnt, in der liebenswürdigsten Weise von dem so erfolgreichen Sammler, Herrn Prof. Charles Fuller Baker, in Los Baños, zur Verfügung gestellt wurden. Mit wenigen Ausnahmen, die weiter unten erwähnt sind, stammen sie alle aus Luzon und sind die neuen Arten, nicht aber die neuen Varietäten, gleichlaufend mit den Beschreibungen numeriert worden. Folgende Arten finden in der eingehaltenen Reihenfolge Erwähnung, oder werden als neu beschrieben:

CURCULIONINÆ

1. *Metapocyrtus pachyrrhynchoides.*
2. *Metapocyrtus bakeri.*
3. *Eupyrgops banahaonis.*
4. *Polycatus eupholoides:* Mindanao.
5. *Auletobius ascendens.*
6. *Parimera trivittata.*
7. *Parimera negrito.*
   Parimera negrito var. *variabilis.*
8. *Megarrhinus suratus.*
   Megarrhinus carinicollis: Banguey.
   Megarrhinus alternans: Formosa.
9. *Agametina* (gen. nov.) *discomaculata.*
10. *Chirozetes arotes.*
    Pempheres habena Pasc.
11. *Poropterus bengueticus.*
12. *Tragopus pygmaeus.*
    Cyamobolus sturmi var. *definitus.*
    Cyamobolus charpentieri Bohem.
13. *Otidognathus fulvopictus.*
14. *Prodioctes (?) rubrovittatus.*
15. *Cercidocerus curvaturatus.*
16. *Aphioda integripennis.*

CERAMBYCINÆ

17. *Halme (?) spinicornis.*
18. *Polyphida monticola.*
19. *Nericonia glabricollis.*
20. *Diochares mindanaonis:* Mindanao.
21. *Cereopsius irregularis.*
22. *Anancylus strix.*
23. *Cacia xenoceroides.*
24. *Cacia ulula.*
25. *Cacia proteus.*
    Cacia proteus var. *disjuncta.*
26. *Euclea ruficollis.*
27. *Proteuclea* (gen. nov.) *lateri-vitta.*
28. *Xyaste uniformis.*
29. *Xyaste varioscapus.*
30. *Xyaste trigonocephala.*

CURCULIONINÆ

1. **Metapocyrtus (Orthocyrtus) pachyrrhynchoides** sp. nov. Tafel I, Fig. 1 und 2.

Aterrimus, prothorace margine apicali basalique, utrinque lineis submarginalibus et supracoxalibus conjunctis, elytris vittis tribus, laterimarginali discalique integris, subsuturali in tertia parte mediana interrupta ac hic lineola transversa determinata, lateribus inter lineis longitudinalibus, in primo et secundo triente lineolis transversis, pallide aurato-squamulosis.

Long., 15; lat., 7 mm.

LUZON, monte Banahao.

Schwarz, etwas fett glänzend, mit blassgoldiger hie und da schwach grünlicher Schuppenlinienzeichnung. Körper gestreckter wie bei *Orthocyrtus triangularis* m., viel feiner und zerstreuter punktiert, der Rüssel von ganz ähnlicher Bildung, Stirn jedoch ohne Mittelfurche, undeutlich entfernt punktiert. Fühlerschaft leicht geschwungen, den Augenhinterrand kaum erreichend, Keule sehr wenig kürzer als das 1. und 2. Geisselglied, die unter einander ungefähr gleich lang sind. Oberrand der Augen mit Furche. Halsschild sehr wenig breiter als lang, mit gleichmässig gerundeten Seiten, zerstreut und undeutlich punktiert, eine Linie auf dem Vorder- und Hinterrand, die jederseits innerhalb des Seitenrandes und dicht über den Vorderhüften durch eine Längslinie mit einander verbunden sind, blass goldgelb beschuppt. Flügeldecken entfernt zerstreut, kaum gereiht punktiert, Seitenrand und Mitte jeder Decke mit einer ganzen, zwischen Naht und Deckenmitte je mit einer im mittleren Drittel unterbrochenen und T-förmig endigenden hell beschuppten Längslinie. In gleicher Höhe mit dem T-förmigen Querstrich findet sich im 1. und 2. Deckendrittel zwischen Rand und Discalstreifen ein kurzer Schuppenquerstrich. Alle hellen Längsschuppenstreifen der Decken sind an der Deckenwurzel und an der Spitze mit einander verbunden. In der Mitte der Naht je ein kurzer Längsstrich, im 4. Fünftel je ein länglicher Punkt,

ebenfalls hell beschuppt. Hinteres Drittel des Deckenseitenrandes wie bei den verwandten Arten (z.B. *O. triangularis* und *O. politus*) durch eine Furche wulstartig abgesetzt. Vorderseite der Vorderhüften, Hinterrand der Mittelbrustepimeren, das Metasternum, die Ränder ausgenommen, eine grössere Makel jederseits auf dem 1., eine kleine jederseits auf dem 2. Abdominalsternit und vor der Schenkelspitze wie die Linien auf den Decken goldgelb beschuppt.

Die komplizierte Linienzeichnung der Art erinnert viel mehr an *Pachyrrhynchus* als an *Metapocyrtus*, daher der gewählte Artname.

2. Metapocyrtus (Orthocyrtus) bakeri sp. nov. Tafel I, Fig. 3 und 4.

Aterrimus, prothorace margine apicali basalique utrinque lineis submarginalibus et supracoxalibus conjunctis, elytris margine basali, laterali lineaque subsuturali in triente parte mediana interrupta, altera discali in secundo triente, lineis transversis, punctatim interruptis, in primo et in secundo triente, hac solum usque ad vittam subsuturalem extensa, pallide viridi-squamosis; tibiis dorso maculaque anteapicali in femoribus aurato-squamosis.

Long., 11; lat., 5 mm.

LUZON, monte Banahao.

Mit vorigem (*O. pachyrrhynchoides*) verwandt, aber kleiner, Stirn mit Mittelfurche, Flügeldecken mit anderer und blassgrün beschuppter Linienzeichnung. Rüssel länger als breit, nach vorn konisch verbreitert, seine Wurzel und die Stirn mit gemeinsamer länglicher, goldig beschuppter Makel, eine ähnliche unter dem Auge. Halsschild wenig breiter als lang, auf der Scheibe zerstreut punktiert, die grünen Schuppenstreifen unterhalb des Seitenrandes vorn etwas verbreitert, die darunter liegenden Halsschildseiten fast unpunktiert. Decken unregelmässig und kaum gereiht punkiert, ein breiter Seiten und schmälerer Basalrand, so wie ein der Naht näher als dem Seitenrand verlaufender Längsstreifen, der im 2. Viertel der Länge unterbrochen ist, ein anderer kurzer Längsstrich im 2. Deckendrittel zwischen letzterem und dem Seitenrand, und eine punktartig unterbrochene Querlinie im 1. und 2. Drittel der Deckenlänge, von welchen die hintere jedoch nur bis zur subsuturalen Längslinie reicht, blassgrün beschuppt. Epimeren der Mittelbrust, die Hinterbrust und jederseits das 1. und 2. Bauchsternit, so wie die Schenkel vor der Spitze mit grüner Schuppenmakel. Rücken der Schienen rötlichgolden beschuppt. Bei dem typischen Exemplar ist der subsuturale Schuppenstreifen im 2. Drittel der Naht durch

eine astartige Erweiterung mit dem gegenüberliegenden verbunden, während bei dem zweiten Stück (in coll. Baker) diese Schuppenlinien durch die Naht getrennt bleiben.

3. Eupyrgops banahaonis sp. nov. Tafel I, Fig. 5 und 6.

Eupyrgops submaculato Faust major, niger, elytris, margine laterali, basi excepta, plagisque irregularibus, quarum subsuturali vittiforme, subaurato- aut coeruleo-squamosis; rostro dorso utrinque late sulcato, in medio subsulcato; prothorace latitudine perpaulo longiore, sat nitido, remote punctato; margine antico in medio interrupto, maculis utrinque intra angulis posticis, vitta supracoxali, anguste interrupta, pallide viridi-aurato (aut coeruleo-) squamosis; elytris ampliatis, subseriato-punctatis, in dimidia parte basali transverse subrugulosis, in dimidia parte apicali punctis asperatis, stria prima secundaque apice fossulatis; corpore subter remote punctato.

Long., 15; lat., 7 mm.

LUZON, monte Banahao.

Grösser als *E. submaculatus* Faust und der Körperform nach an einen grossen *Pachyrrhynchus* erinnernd. Rüsselrücken jederseits mit breiter, sich nach vorn verschmälernder, in der Mitte ohne, oder mit undeutlicher Längsfurche. Stirn nur vorn mit kurzer Längsfurche, hinter der Basalfurche des Rüssels mit grünlicher Beschuppung, im übrigen sehr vereinzelnt punktiert. Halsschild etwas länger als breit, seine grösste Breite vor der Mitte, kräftig aber entfernt punktiert, der Vorderrand und damit im Zusammenhang stehend, ein Längstreifen über den Vorderhüften, beide in der Mitte unterbrochen, so wie eine etwa dreiekkige Makel innerhalb der Hinterecken grünlich oder bläulich beschuppt. Flügeldecken breit eiförmig, entfernt und klein gereiht punktiert, die breiten Zwischenräume in der vorderen Deckenhälfte hie und da etwas querrunzelig, die Punkte in der hinteren Deckenhälfte, soweit sie von Schuppen frei sind, raspelig gekörnt; die vorgezogene Deckenspitze jederseits mit tiefem Längseindruck. Die unsymetrische Schuppenmakelzeichnung besteht in einem Längsstreifen auf der hinteren Hälfte des Seitenrandes, in einem eben solchen, aber kaum das erste Deckendrittel erreichenden, an der Schulter und einem längeren auf dem 2. Spatium, beide sind an der Wurzel mit einander verbunden, letzterer fliesst zuweilen auch mit der hinter der Deckenmitte gelegenen, unregelmässigen Makel zusammen. Eine andere unregelmässige grössere Makel, die mit einer submarginalen hinter der Deckenmitte meist zusammenhängt, befindet sich vor der Deckenspitze; sie wird von der gegenüberliegenden nur durch

einen feinen schwarzen Nahtstreifen getrennt. Kleinere Schuppenmakeln finden sich je am Seitenrand über den Hinterhüften, zuweilen auch zwischen den beiden ersten Längsstreifen, in der vorderen Deckenhälfte. Mittelbrust, Epimeren, Hinterbrust, die Schenkel an der Wurzel und vor der Spitze, 1. und 2. Bauchsternit an den Seiten grün beschuppt.

4. **Polycatus eupholoides** sp. nov. Tafel I, Fig. 7 und 8.

Aterrimus, pallide coeruleo- aut viridi-aurato-squamosus, elytris fasciis duabus aut tribus spatioque secundo in triente basali (in femina etiam in 3., 5. et 6.) nigro-denutatis; rostro dorso acute carinulato; prothorace linea mediana in medio dilatata, nigro-glabra; elytris remote seriato-punctatis, spatiis alternatis angustioribus, in dimidia parte apicali remote ac seriatim fusco-setosis, stria prima secundaque apice impressis.

Long., 13.5–15; lat., 5–7 mm.

MINDANAO, Talkulan.

Gedrungener als *P. aurofasciatus* Heller[1] jedoch in beiden Geschlechtern sehr auffallend verschieden gezeichnet, Halsschild grösstenteils, Flügeldecken nur teilweise mit matt goldgrünen oder bläulichen Schüppchen bedeckt, so dass wenigstens das 1. Spatium und die Deckenwurzel so wie zwei Querbinden, beim Weibchen ausserdem 2–3 Längsstreifen im Spitzendrittel kahl schwarz sind. Rüssel mit deutlich nach vorn divergierenden Seiten, ungefähr $1\frac{1}{2}$ mal so lang wie an der Spitze breit, mit scharfer Dorsalleiste, die zwischen den Augen in einen runden Kahlfleck mit Grübchen endigt, die Seiten der Länge nach eingedrückt und grob punktiert. Fühler dicht grünlichgrau beschuppt, das 2. Glied der Geissel beim Männchen wenig länger, beim Weibchen so lang wie das erste (wie bei *P. aurofasciatus*, was bei dessen Beschreibung nicht erwähnt ist). Keule beim Männchen schwarz, beim Weibchen blass rotbraun. Halsschild fast so lang wie breit (3.5 × 4), vor der Mitte etwas breiter als am Hinterrande, mit glatter in der Mitte erweiterter kahler Mittellinie, im übrigen zerstreut punktiert und ziemlich dicht mit bläulichen oder goldgrünen Schüppchen bedeckt, die am Vorderrande und beiderseits der Mittellinie, in der hinteren Halsschildhälfte, mehr weisslich und dicht gedrängt sind. Beim Weibchen findet sich beiderseits dicht hinter der Mitte, in der Mitte zwischen Seitenrand und Mittellinie, ein grübchenartiger Schrägeindruck. Flügeldecken entfernt gereiht punktiert, die Punktreihen den leicht erhabenen Basalrand nicht erreichend,

[1] *Phil. Journ. Sci., Sec. D* (1912), 7, 380, Tafel II, Fig. 15.

die 1. von der Wurzel nach der Mitte der Naht zu sich von dieser allmählich entfernend und so wie die übrigen und alle Spatien im Spitzendrittel mit gereihten bräunlichen Börstchen, das 2., 3. und 5. Spatium breiter als die übrigen. Beim Männchen überwiegt der beschuppte Teil der Decken den kahlen, so dass mehr als das ganze Basaldrittel, mit Ausnahme des 1. Spatiums und zweier kahler Querbinden, blass bläulichgrün beschuppt sind. Die erste Kahlbinde liegt in der Deckenmitte und reicht bis zum Seitenrand, die zweite im zweiten Drittel und wird durch das 7. Spatium unterbrochen. Beim Weibchen sind die kahlen und beschuppten Stellen ungefähr von gleicher Ausdehnung, die schwarzen Querbinden sind breiter als die beschuppten und diese häufig unterbrochen, das 2., 3. und 6. Spatium sind im Spitzendrittel schwarz kahl, die dazwischen liegenden beschuppt, ausserdem findet sich im 1. Viertel der Deckenlänge noch eine dritte, bis zur dritten Punktreihe nach innen reichende kahle Querbinde. Unterseite dicht graugrün oder goldgrün beschuppt, mit zerstreuten gelbbraunen Borstenschüppchen. Analsternit des Weibchens jederseits an der Wurzel mit eingedrücktem Strichelchen.

5. Auletobius ascendens sp. nov.

Rufescescenti-fulvus, elytris subviridiaeneo-lavatis, crebre punctatis, praeterea seriato-punctatis, stria suturali, basi excepta, impressa; rostro prothorace longiore, dorso basi sulcato; antennis ad rostri basin insertis, clava triarticulata, articulo tertio duobus praecedentibus paulo longiore; prothorace longitudine latitudine basali fere aequali, lateribus rectis, antrorsum convergentibus, angulis posticis rotundatis; pedibus flavescentibus, unguiculis fissis.

Long., 2.8; lat., 1.6 mm.

LUZON, monte Maquiling.

Gelbrot, Hinterbrust schwärzlich, Flügeldecken schwach erzgrün übergossen, Rüssel in der Apicalhälfte und die Fühler schwärzlich. Rüssel linear, länger als der Halsschild, im basalen Drittel mit Dorsalfurche, beiderseits davon mit entfernt gereihten Punkten. Fühler nahe der Rüsselwurzel eingefügt, so dass die Spitze des 2. Fühlergliedes über den Augenvorderrand nach hinten reicht. Fühlergrube gestreckt oval, das Auge nicht erreichend. Zweites Fühlerglied länger als das etwas dickere 1. und wenig kürzer als das 4., das sechsmal so lang wie an der Wurzel dick ist, die folgenden an Länge abnehmend, die dreigliedrige Keule so lang wie die vier vorhergehenden Glieder zusammen, ihr 1. und 2. Glied so lang wie breit, das 3. Keulenglied

sehr wenig länger als die beiden vorhergehenden zusammen. Kopf an den halbkugelig vorgequollenen Augen so breit wie lang, Stirn gewölbt mit sehr feinen, nach vorn gerichteten Härchen, Scheitel mit verhältnismässig groben Querfurchen. Halsschild vor der Basis kaum so breit wie seine Mittellinie lang ist, die Seiten gerade, nach vorn convergierend, die Hinterecken verrundet in den etwas kupfrig gesäumten Hinterrand übergehend. Oberseite fein und dicht punktiert und fein behaart. Schildchen gleichseitig dreieckig verrundet. Flügeldecken nicht ganz doppelt so breit wie lang (2.5 × 4.3), die Seiten gerade, nach hinten zu kaum merklich divergierend, die Spitze gemeinsam abgerundet, dicht und fein punktiert, ausserdem mit Reihen entfernter wenig grösserer Punkte, von denen die erste, neben der Naht, ausgenommen im basalen Fünftel tief streifenartig eingedrückt ist. Abdomen glänzend, nach der Spitze zu kaum erkennbar punktiert, Naht zwischen dem 1. und 2. Sternit verstrichen. Hinterschenkel das 3. Bauchsternit nicht überragend. Füsse kräftig, ihr 1. Glied nicht länger als das 2. und 3. zusammen genommen. Klauen gespalten.

6. **Parimera**[2] **trivittata** sp. nov.

Fulvo-testacea, rostro, clava, vertice, scutello, vitta mediana thoracali, sutura vittaque utrinque sublaterali in elytris, nigris; maris rostro elytris parum breviore, in dimidia parte apicali dorso utrinque et in medio longitudinaliter remote seriato-granuloso, in dimidia parte basali tricarinulato, feminae subtiliter remoteque punctato; funiculi articulo primo secundo longiore ac crassiore, reliquis, etiam ultimo, oblongo-conicis; prothorace latitudine longiore, fere conico, maxima latitudine ante basin, crebre subtiliterque punctato, vitta mediana nigra, tertia parte marginis apicalis aequilata; elytris punctato-striatis, spatiis crebe punctatis, vitta sublaterali nigra, in spatio quinto et sexto disposita et basi apiceque abbreviata; femoribus anticis haud dentatis; maris tibiis anticis in duabus trientibus apicalibus articuloque primo tarsali longe fulvo-fimbriatis.

Long., 3–4, lat., 1–2 mm.

LUZON, monte Maquiling, in palmae Pinangae inflorescentiis.

7. **Parimera negrito** sp. nov.

Unicolor, nigra, solum scapo subfuscescenti femoribusque intermediis interdum etiam prosterni in dimidia parte basali flavescentibus; rostro elytris longioribus (in utroque sexu), maris in dimidia parte apicali utrinque et in linea mediana seriato-

[2] Faust, *Stett. Ent. Zeitg.* (1896), 57, 146.

granuloso, apice dilatato; antennis post medium rostri insertis, funiculi articulo primo secundo vix longiore, reliquis oblongo-conicis, ultimo longitudine paulo latiore; prothorace subconico, longitudine latitudine maxima (ante basin) aequali, margine basali in angulis posticis denticulato-prominente; scutello minuto, trigono; elytris punctato-substriatis, spatiis pygidioque crebre punctatis; femoribus anticis fortiter dentatis, maris tibiis anticis margine interno in duabus trientibus apicalibus fulvo-fimbriatis.

Long., 5–7 (mas); lat., 2–2.5 (mas) mm.

LUZON, monte Maquiling, eodem tempore et loco cum praecedenti.

Parimera negrito var. variabilis var. nov.

Differt a specie typica: prothorace rufo-testaceo, in medio nigro- vittato, elytris vitta discali, aut totis, femoribus omnibus, anticis nigris interdum exceptis, plus minusve fulvis, abdomine fulvo aut nigro.

Magnitudine et habitatione praecedentis.

Die Arten der Gattung lassen sich nach folgenden Merkmalen auseinander halten:

a^1. Flügeldecken dicht tomentiert, die Streifen daher undeutlich, ohne wahrnehmbare Punkte.

b^1. Alle Deckenstreifen gleich fein, Decken bräunlichschwarz, ihr Basal- und Apicalrand mit lehmgelben Toment, das an der Wurzel des 1., 3. und 5. Spatiums kurz streifenartig ausgezogen, am Nahtwinkel schnörkelartig aufgebogen ist..... signata Faust.[3]

b. Deckenstreifen 3, 5 und 7 stärker als die übrigen eingedrückt, Naht, das 4., 5. und 6., die Wurzel des des 7. und fast das ganze 8. Spatium bräunlich, der übrige Teil der Decken gelblich.
vittata Faust.

a^2. Flügeldecken mässig dicht tomentiert, immer mit deutlichen Punktstreifen.

c^1. Vorderschenkel gezahnt, Käfer teilweise dunkel rot und schwarz, oder ganz schwarz.

d^1. Rüssel des Männchens in der Apicalhälfte oberseits in der Mittellinie und am Seitenrand mit deutlicher Körnerreihe, in der Basalhälfte ohne Mittelleiste.

e^1. Rüssel des Weibchens kürzer als die Flügeldecken, 1. Geisselglied länger und dicker als das 2., das 3.–6. fast kugelig.
obscura Faust.

e^2. Rüssel des Weibchens deutlich länger als die Flügeldecken.

f^1. Körper mit Ausnahme der gelben Mittelschenkelwurzel und des rötlichen Fühlerschaftes ganz schwarz, 1. und 2. Geisselglied gleich lang..... negrito sp. nov.

f^2. Körper zweifarbig, Halsschild grösstenteils rot.
negrito var. variabilis.

[3] Ibid. (1896), **57**, 147.

d^2. Rüssel in der Apicalhälfte höchstens am Seitenrande, nicht aber auch in der Mittellinie, mit einer Körnerreihe, 1. Geisselglied deutlich länger als das 2 ..... uniformis Faust.

c^2. Vorderschenkel ungezahnt.

g^1. Körper rotgelb, Rüssel, Halsschildmittelstreifen und Decken schwarz ..... vitticollis Heller.[4]

g^2. Körper gelb, Rüssel, Halsschildmittelstreifen, Naht und je ein an der Wurzel und Spitze abgekürzter Deckenseitenstreifen schwarz ..... trivittata sp. nov.

8. **Megarrhinus suratus** sp. nov.

Niger, rostro prothorace longiore, sat dense punctato, antennis nigris, clava funiculi longitudine aequante; prothorace subconico, maxima latitudine ante basin, longitudine perpaulo latiore, subtiliter granoso; scutello transverso, rotundato, margine antico sinuato, crebre punctato, margine postico levi; elytris subpunctato-striatis, spatiis carinulatis, subtilissime granuloso-rugosis, limbo apicali membranaceo, nigricante; pygidio rude rugoso; corpore subter sat dense fortiterque punctato, punctis singulis fasciculo e pilis brevibus, griseis; femoribus posticis intermediis distincte brevioribus; tibiis anticis in primo triente margine interno dentatim dilatato.

Long., 4.5; lat., 2.5 mm.

LUZON, montibus Maquiling et Banahao.

Die Art unterscheidet sich von allen bekannten durch den relativ längeren, an den Seiten weniger gerundeten, fast konischen, fein gekörnten Halsschild, dessen grösste Breite nahe an der Basis liegt. Sie ist einfärbig schwarz, ihr Rüssel relativ lang und ihre Deckenspatien sind vom 2. ab am Aussenrand scharf kantig; der häutige Spitzensaum ist schwärzlich. Schildchen quer, hinten gerundet, sein Vorderrand ausgebuchtet, bis auf den glatten Hinterrand ziemlich dicht punktiert.

Zwei weitere noch unbeschriebene Arten, die eine von der Insel Banguey (N. Borneo), die andere von Formosa, sind:

Megarrhinus carinicollis sp. nov.

Totus aterrimus, rostro prothorace longiore, crebre punctato; antennis clava funiculo breviore; prothorace longitudine latiore, ad basin perpaulo angustato, subtiliter granuloso, carinula mediana levi; scutello transverso-rotundato, margine antico sinuato,

[4] *Abh. u. Ber. Mus. Dresden* (1900–1), No. 5, 35, Taf. IV, Fig. 14, aus Celebes. Die Fühlerbildung und habituelle Ähnlichkeit veranlasste mich schon damals diese Art so wie heute *vitticollis* zur Gattung *Parimera* zu stellen, die wegen den ungezähnten Vorderschenkel leicht für eine *Telphasia* Pasc., *Ann. Mus. Civ.* (1885), 235, gehalten werden könnte.

postico levi; elytris latitudine humerali brevioribus, punctato-striatis, sutura elevata, spatiis granulosis, margine externo carinato-declivi; tibiis anticis margine interno, post medium perobsolete dentato-dilatato.

Long., 4; lat., 2 mm.

BANGUEY, Borneo bor. (ex coll. *J. Faust*).

Megarrhinus alternans sp. nov.

Niger, tomento griseo, in prothorace subvittatim, parce tectus; rostro prothorace breviore; antennarum clava nigra, funiculo rufescenti breviore; prothorace transverso crebre punctato, ante scutellum impresso, disco utrinque griseo uni- aut bivittato; scutello rotundato, convexiusculo, crebre punctato; elytris subpunctato-striatis, sutura elevata, spatiis punctatis, parce pilosis, alternatis (2., 4. et 6.) margine externo fortius carinatis, limbo marginali nigricante; tibiis anticis margine interno in triente basali dentatis.

Long., 4; lat., 2.1 mm.

FORMOSA, Taihorinsho et Alikang, legit H. Sauter.

Die somit mir bekannten *Megarrhinus*-Arten lassen sich wie folgt unterscheiden:

a^1. Halsschild mit bis zur Mitte nach vorn reichender Mittelleiste.
  b^1. Innenrand der Vorderschienen, vor der Mitte, mit zahnartiger Erweiterung ..... **brachmanus Faust.**
  b^2. Innenrand der Vorderschienen, hinter der Mitte, mit schwacher zahnartiger Erweiterung ..... **carinicollis sp. nov.**
a^2. Halsschild nur vor dem Schildchen auf dem Grund eines Eindruckes mit kurzer Mittelleiste, Fühler und Decken rötlich..... **subfasciatus Faust.**
a^3. Halsschild ganz ohne Mittelleiste.
  c^1. Vorderschienen am Innenrande nicht zahnartig erweitert. **cingalensis Faust.**
  c^2. Vorderschienen am Innenrande deutlich zahnartig erweitert.
    d^1. Halsschild mit gerundeten Seiten, seine grösste Breite nahe der Mitte.
      e^1. Die vier neben der Naht gelegenen Spatien sehr flach gewölbt, Decken rötlich, mit zwei grauen Tomentquerbinden. **bifasciatus Faust.**
      e^2. Spatien, vom dritten ab, am Aussenrande scharf kantig abfallend.
        f^1. Zahnartige Erweiterung der Vorderschienen in der Mitte, Spatien gleichmässig kantig..... **infidus Faust.**
        f^2. Zahnartige Erweiterung der Schienen hinter der Mitte, 2., 4. und 6. Spatium etwas stärker hervortretend. **alternans Faust.**
    d^2. Halsschild mit schwach gerundeten Seiten, fast konisch, seine grösste Breite nahe der Basis..... **suratus sp. nov.**

Genus **AGAMENTINA** novum

Zygopidarum prope Agametis Pascœ

Differt a genere Agametis: rostro breviore, funiculi articulo secundo primo paulo longiore, prothorace basi truncato, lateribus rotundatis, elytris oblongo-trigonalibus, femoribus clavatis ac brevioribus.

Die Gattung unterscheidet sich von *Agametis* durch das relativ kürzere 2. Geisselglied, den an der Basis nicht zweibuchtigen, sondern gerade abgestutzten Halsschild, dessen Seiten stark gerundet sind, die länglich dreieckigen, kahnförmigen Flügeldecken, die auf der Scheibe abgeflacht sind und die keulenartig verdickten, kurzen Schenkel.

9. **Agametina discomaculata** sp. nov.

Nigra, subter sqamulis ferrugineis sat parce, subter albidis dense tecta; rostro flavo, basi infuscato, carinula mediana, ac crebrius punctato; elytris squamoso-striatis, spatiis striis haud latioribus, secundo, praesertim ante declivitatem, quarto quintoque carinulatis, macula suturali oblongo-trigona, nigro-velutina; femoribus in dimidia parte apicali subinfuscatis, squamulis albidis remotis.

Long., 5; lat., 1.8 mm.

LUZON, monte Maquiling.

Schwarz, oberseits mit rostbraunen Schüppchen mässig dicht, unterseits mit weissen Schüppchen dicht bedeckt, eine längliche keilförmige Nahtmakel in der Deckenmitte, die ihre Spitze dem Schildchen zukehrt und hinten von einer querovalen schmutzig gelbgrauen Schuppenmakel begrenzt wird, sammtschwarz. Rüssel gelb, kaum so lang wie der Halsschild, in der Basalhälfte bräunlich und mit Mittelleiste, an den Seiten mit gelblichen Schuppenbörstchen. Fühler gelbbraun, 2. Geisselglied wenig länger, das 3. etwas kürzer als das 1., das 4. walzenförmig, $1\frac{1}{2}$ mal so lang, das letzte so lang wie dick, Keule so lang wie die 3 vorhergehenden und das halbe 3. Geisselglied zusammengenommen. Halsschild quer mit abgesetztem, stark ausgebuchtetem Vorderrande, sehr grob und dicht punktiert, jeder Punkt von einer rostgelben, in der Halsschild Mittellinie von einer helleren Schuppe ausgefüllt. Schildchen länglich, nach hinten zu verbreitert und verrundet. Flügeldecken kahnförmig, in den Punktstreifen rostfarbig gereiht beschuppt, die Spatien schmäler als die Streifen, undeutlich gekörnelt, hie und da mit entfernten weissen Schüppchen, das 4. und 5. in der Mitte, das 2. hinter der Mitte stärker vortretend, letzteres vor dem Deckenabsturtz etwas

höckerig, Naht im mittleren Drittel zwischen den 2. Spatien mit sammtschwarzen Keilfleck. Unterseite weisslich beschuppt, die dicken keulenförmigen Schenkel in der Apicalhälfte angedunkelt, mit kräftigem Zahn bewehrt, die hinteren die Deckenspitze eben erreichend. Schienen und Tarsen etwas rotgelb.

10. Chirozetes arotes sp. nov.

Robustus (major quam sphaerops Wied.) niger subter parte anteriore metaepisternarum nigra excepta, scutello, prothorace in dimidia parte basali linea mediana, elytris ad suturae basin linea T- aut V-forme inversa punctisque marginalibus ad basin et ante apicem transverso-fasciatim dispositis albido-, punctis numerosis lateralibus in prothorace et in elytris lineolaque mediano-apicali in prothorace, ochraceo-squamosis; prothorace disco haud carinulato; elytris, spatio primo in dimidia parte basali remote seriato-granuloso, tarsis anticis, praesertim maris, nigro-ciliatis. Mas: prosterni cornubus subrectis, paulo divergentibus, apice dilatis, margine apicali exciso.

Long., 13; lat., 5 mm.

LUZON, monte Banahao.

Eine der grössten Arten, mit mehr gestreckt elliptischen als cylindrischen Flügeldecken. Schwarz, Halsschildseiten spärlich, die vordere Hälfte der Mittellinie dichter stroh- bis lehmgelb, hintere Hälfte der Mittellinie, die Hinterecken des Halsschildes, das Schildchen, die Decken an der Wurzel, namentlich innerhalb der Schultern, eine gemeinsame verkehrt V-förmige oder pfeilförmige Makel an der Nahtwurzel, eine punktförmig unterbrochene Querbinde vor der Spitze und die Spitze des 2. Spatiums weiss, zahlreiche Längspunkte an den Deckenseiten gelblich beschuppt. Erstes und 2. Geisselglied der etwas bräunlichen Fühler des Männchens gleich lang, beim Weibchen das 2. deutlich länger als das 1., die folgenden ziemlich kugelig, zusammen kürzer als das 1. Keulenglied. Rüssel im Basalteil mit 5, beim Weibchen undeutlicheren Längsleisten, von welchen die mittlere sehr fein ist. Halsschild breiter als lang, mit ausgebuchtetem Vorderrand, hintere Hälfte der Seitenränder nahezu parallel, Hinterecken rechtwinkelig verrundet, Scheibe in der hinteren Hälfte querrunzelig gekörnt, in der vorderen dicht punktiert, nur beim Weibchen in der Mitte mit Andeutung eines kurzen Kielchens. Schildchen wenig länger als breit, schwach trapezoidal. Flügeldecken an der Wurzel fast gerade abgestutzt, die Spatien unter einander von ziemlich gleicher Breite, breiter als die Punktstreifen und raspelartig gekörnt, nur das 1. Spatium in der Apicalhälfte ungekörnt, matt. Prosternalbewehrung des

Männchens gerade, etwas schräg nach oben gerichtet, von oben gesehen leicht nach vorn divergierend und etwas geschwungen, der Spitzenteil schaufelartig verbreitert, am Vorderrand derartig ausgeschnitten, dass die äussere Spitze länger und mehr nach aussen gerichtet ist. Unterseite weisslich, die vordere Hälfte der Hinterbrustepisternen und ein Längsstreifen unterhalb des Halsschildseitenrandes schwärzlich tomentiert. Tarsen unterseits schwarz bewimpert, Spitze des 1. Vordertarsengliedes, die ganze Oberseite des 2. und 3. Gliedes weiss behaart. Klauenglied rötlich gelbbraun.

Pempheres habena Pasc.

Ein Exemplar aus Luzon, von Prof. Baker auf dem Banahao gesammelt, unterscheidet sich von dem typischen *P. habena* Pasc. dadurch, dass die weissliche Beschuppung der Naht auch an der Wurzel auf diese beschränkt bleibt und der helle Mittelstreifen auf dem Halsschild hinten abgekürzt und nicht verbreitert ist. Bei der Seltenheit der Arten dieser Gattung, von denen mir nur Einzelstücke vorliegen, lässt sich vorläufig nicht sagen, wie weit die erwähnten geringen Abweichungen konstant sind und zu einer besonderen Benennung berechtigen.

11. **Poropterus benguetícus** sp. nov. Tafel I, Fig. 9.

Poropterus irrito Pasc.[5] subsimilis, sed paulo minor, elytris pone humeros obtusangulatis ac tuberculatis summo apice abrupte declivi; prothorace in triente apicali transverse constricto ac utrinque tuberculato, disco tuberculis granosis duabus, singulis antrorsum seria e granulis circiter quatuor exmitente, lateribus tuberculosis, basin versus convergentibus; elytris remote fortiterque seriato-punctatis, spatiis salebrosis, sutura in dimidia parte apicali tribus tuberculis geminatis, remotis, spatio primo basi apiceque, spatio secundo prope basin, ad apicem et in medio et post medium tuberculis majoribus oblongis, spatio quarto ante et post medium tuberculis rotundatis paulo minoribus, spatiis reliquis tuberculis minutis dispersis, duobus extremis in parte mediana haud tuberculatis.

Long., 9; lat., 5 mm.

LUZON, monte Maquiling.

Das mir vorliegende einzige Exemplar ist bis auf die grösseren Tuberkeln, die den Scheitel braun borstig beschuppt zeigen, schwarz, kahl abgerieben und etwas kleiner als *P. irritus* Pasc. aus Ceram, und von diesem durch die abweichende Form des Halsschildes, der Decken und durch die andere Verteilung der

[5] *Ann. & Mag. Nat. Hist.* (1888), VI, 2, 418.

Höcker verschieden. Rüssel mässig dicht und grob punktiert, Stirn zwischen den Augen mit tiefem Furcheneindruck, vom Scheitel, wie bei allen typischen Arten der Gattung, buchtig abgegrenzt. Fühler dunkel rotbraun, 2. Geisselglied länger als das 1., die folgenden so lang wie dick, nach der Keule zu etwas an Grösse zunehmend. Halsschild so lang wie breit, im vorderen Drittel abgeschnürt und jederseits mit länglichem Höcker, seine Scheibe jederseits mit einem gekörntem Längshöcker, der nach vorn eine Reihe von ungefähr vier Körnchen entsendet. Flügeldecken an der äussersten Spitze plötzlich steil abfallend, von oben gesehen daher abgestutzt erscheinend, in der hinteren Hälfte der Naht mit drei von einander entfernten Paaren von kleineren Höckern.

Erstes Spatium an der Wurzel und an der äussersten Spitze, 2. Spatium nahe der Wurzel, in und hinter der Mitte, so wie ebenfalls an der Spitze mit grösserem länglichen, 4. Spatium dicht vor und hinter der Mitte mit kleineren rundlichen Höckern, im übrigen mit zerstreuten Körnern, die zwei äusseren Spatien, die Wurzel und Spitze ausgenommen, ohne Körner. Abdomen unpunktiert. Schenkel entfernt punktiert und beborstet, im Spitzendrittel stark gekrümmt, die hinteren die Deckenspitze knapp erreichend. Schienen aussen mit Längsleisten.

12. **Tragopus**[6] **pygmaeus** sp. nov.

Aterrimus, parce breviterque nigro-, punctis nonullis ochraceo-squamoso-setosis; rostro parum arcuato, latitudine fere triplo longiore, prothorace breviore, rude subseriato-punctato ac setuloso; antennis prope ante medium insertis, scapo subrufescenti funiculi articulo secundo primo longiore, reliquis moniliformibus, clava ovata, articulisquinque praecedentibus æquilonga; prothorace longitudine latitudine aequali, lateribus rotundatis, basin versus paulo, antrorsum fortius angustatis, basi subsinuato-truncata, rude punctato, spatiis minute granulatis, parce, margine antico dense nigro-, seria transversa discoidali e punctis quatuor, basali e punctis tribus ochraceo-tomentosis; elytris breviter ovatis, rude seriato-, lateribus irregulariter foveato-punctatis, sutura spatiisque tres internis minute seriato-spatiis externis vix granulatis; femaribus fere reticulatim, tibiis carinulato-punctatis.

Long., 5–6.5; lat., 3 mm.

LUZON, monte Maquiling.

[6] Vergl. die Gattungstabelle von A. Lea: *Proc. Linn. Soc. N. S. Wales* (1913), 38, 452.

Von Gestalt des *P. fossulatus* Faust aber mindestens um die Hälfte kleiner, schwarz, kurz schwarz beborstet, einige Querreihen bildende Punkte auf dem Halsschild und den Decken lehmgelb beborstet (letztere nur bei gut entfetteten Exemplaren deutlich). Rüssel grob und etwas längsstreifig punktiert, mässig dicht mit nach oben gerichteten schwarzen Schuppenbörstchen besetzt. Fühler dunkel braunrot, 2. Geisselglied länger und schlanker als das 1., die übrigen ziemlich kugelig nach der Keule zu an Grösse und Breite zunehmend, letztere schwarz, stumpf oval. Halsschild so lang wie breit, grubig punktiert, die Spatien mit länglichen, der Vorderrand mit mehr rundlichen, glänzenden Körnern besetzt und daselbst dichter schwarz beborstet. In der Mitte des Vorderrandes mit einem, in der Mitte der Scheibe mit einer Querreihe von vier, an der gleichmässig ausgebuchteten Basis mit einer solchen aus drei lehmgelb beschuppten Punkten. Flügeldecken grob gereiht punktiert, die schmalen, etwas gewölbten Spatien mit entfernten unregelmässigen Körnerreihen, die einzelnen Körner kleiner als das 3. Geisselglied und auf den äusseren 5 Spatien fast ganz fehlend, letztere zeigen einzelne zerstreute weissliche, die übrigen ziemlich dicht stehende schwarze Schuppenbörstchen. Ausserdem finden sich auf der Deckenscheibe mehr oder weniger zahlreiche, bei einem Exemplar vor und hinter der Mitte zu einer undeutlichen Querreihe angeordnete, bei einem anderem ganz fehlende, lehmgelbe Schuppenpunkte. Schenkel sehr grob netzartig punktiert, unbewehrt, die hinteren die Deckenspitze sehr wenig überragend. Schienen an der Aussenseite mit vier Längsleisten, zwischen diesen mit borstentragenden Punktreihen.

Cyamobolus sturmi var. **definitus** var. nov.

Differt a specie typica: superficie, praeter lineis albo-squamosis, unicolore aterrima.

LUZON, monte Maquiling.

Das einzige, mir vorliegende Exemplar dieser Abänderung unterscheidet sich sehr auffällig von *C. sturmi* durch die tief matt schwarze Oberseite, von der sich die weisslich beschuppten drei Längslinien des Halsschildes, der Seitenrand der Decken, der bis zur Mitte reichende Streifen auf dem 1. Spatium und die Querlinie hinter der Deckenmitte scharf abheben. Die Körperunterseite ist viel spärlicher wie bei der Stammart weisslich beschuppt. Da mir der typische *C. sturmi* u. a. auch von der Insel Samar vorliegt, so können erst weitere Stücke aus Luzon dartun, ob die dort vorkommende Form als Aberration, oder als Localrace aufzufassen ist.

Cyamobolus charpentieri, der auf Java und Borneo vorkommt, liegt mir ebenfalls aus Luzon, vom Berg Maquiling, vor.

13. **Otidognathus fulvopictus** sp. nov.

Aterrimus, pro-, meso-, et metasterni lateribus ut scutello dense ochraceo-sericeis, elytris vitta obliqua, post humeros, ad scutellum incipiente et marginem lateralem versus directa, basi apiceque maculatim dilatata, macula rotundata anteapicali, inter suturam et striam quartam et plus minusve cum vitta conuncta, fere litteram C. formante (maculam medianam, nigram suturalem, transversam includente) ut macula minuta marginali anteapicali, fulvis; sternito anali dupliciter punctato.

Long., 16; lat., 7.5 mm.

LUZON, Prov. Tayabas, Malinao.

Dem *O. elegans* an Gestalt und Skulptur ähnlich, aber tief schwarz, jede Decke mit ungefähr C-, respective verkehrt C-förmiger, mit ihrem convexen Teil nach aussen gerichteter gelbroter Zeichnung. Rüssel relativ kürzer, kräftiger und gerader als bei *elegans*, jederseits mit bis zu den Fühlergruben herauf reichender Reihe von länglichen Tuberkeln, zwischen diesen ohne Mittelleiste. Letztes Glied der Fühlergeissel quer. Halsschild durchaus fein, nach den Seiten zu nicht kräftiger punktiert, Hinterrand des Scutellarlappens durch eine Querreihe gröberer Punkte abgegrenzt. Die 5 inneren Deckenstreifen wie bei *elegans* punktiert gestreift, die äusseren gestreift punktiert nur im Spitzenteil eingedrückt, der 1. Streifen ebenso der Wurzel der Naht genähert, Spitze des 4. und 5. Streifens spitzwinkelig mit einander zusammenstossend, die Nahtspitze mit kleinem Zähnchen. Die rötlichgelbe Deckenzeichnung besteht aus je einer länglichen Basalmakel zwischen dem 1. und 4. Streifen und einer viereckigen Seitenmakel zwischen dem 5. Streifen und dem mittleren Teil des Seitenrandes, die durch einen schrägen Streifen mit einander verbunden sind, ausserdem aus einer runden Anteapicalmakel, zwischen Naht und 4. Streifen und einer kleinen streifenartigen auf der Spitze des 8. Spatiums. Analsternit mit doppelter Punktierung.

14. **Prodioctes (?) rubrovittatus** sp. nov.

Angustus, ruber, antennis, prothorace vittis tribus, elytris disco utrinque usque ad striam tertiam, in triente apicali solum sutura, lateribus usque ad striam sextam, abdomine maxima parte, femoribus apice tarsisque totis nigris; antennis funiculi articulis 3.–6. transversis, prothorace latitudine distincte longiore, lateribus in dimidia parte basali parallelis; scutello

lineiforme, latitudine quintuplo longiore; pygidio carinula mediana, parce seriato-setoso.

Long., 8.5; lat., 3 mm.

LUZON, monte Banahao.

Schlank, in Körperform dem centralamerikanischen *Rhodobaenus sanguineus* Gyllh., in der Färbung dem *Rh. rubrovittatus* Champ. ähnlich. Rot, die Fühler, drei Streifen auf dem Halsschild und drei auf den Flügeldecken, von denen der mittlere bis zum 3. Längsstreifen reicht, im Spitzendrittel jedoch auf die Naht beschränkt bleibt, der seitliche, ein schmaler Saum ausgenommen, vom Seitenrand bis zum 6. Streifen reicht, an der Wurzel aber bis auf das äusserste Spatium eingeengt ist. Rüssel gebogen, fast so lang wie der Halsschild, fein zerstreut, im Basalteil kräftiger punktiert und daselbst mit Rückenfurche. Fühler schwarz, ihr 3.–6. Glied sehr deutlich quer, Keule doppelt so lang wie dick, kaum zusammengedrückt, ziemlich kegelförmig, im Spitzendrittel grau tomentiert. Halsschild viel länger als breit, zerstreut punktiert, ohne Längsleisten, der schwarze Mittelstreifen vorn verjüngt, vom Seitenrandstreifen nur die halbe Breite von oben sichtbar. Schildchen linienförmig, fünfmal länger als breit. Flügeldecken mit 10 ganzen, gleich tiefen Streifen, die kaum punktiert sind. Pygidium zerstreut gereiht beborstet, mit Mittelleiste. Unterseite und Beine mit entfernten, von einem grauen Hof umgebenen Borstenpunkten. Alle Hüften, die Mittelbrust so wie das Abdomen, die schmalen roten Ränder der Sternite ausgenommen, und die Schenkelspitzen schwärzlich. Hinterschenkel die Hinterleibsspitze erreichend, Schienen mit kurz beborsteten Längsleisten, 2. Tarsenglied nur wenig länger als breit. Wahrscheinlich liegt eine neue Gattung vor.

15. **Cercidocerus curvaturatus** sp. nov. Tafel I, Fig. 10.

Niger, tomento ochraceo et albido, partim lineis formantibus, tectus; prothorace subtiliter remoteque punctato, lineis albis, una utrinque discoidali, altera supracoxali, sexta subter angulos posticos et in dimidia parte antica abbreviata; elytris striatis, spatiis partim irregulariter, spatio secundo crebrius, seriatopunctatis; sutura, spatio secundo quartoque in quarta parte basali anguste, hic etiam in triente apicali, linea postmediana semicirculari, in spatio sexto post humeros incipiente ut lineis tribus pygidialibus albido-tomentosis; corpore subter albido-, metasterni lateribus pallide ochraceo-abdomine seriebus tribus e maculis punctiformibus nigro-tomentosis.

Long., 12; lat., 5 mm.

LUZON, monte Maquiling.

Etwas an *C. pictus* Faust erinnernd, jedoch mit anderer weisser Linienzeichnung und namentlich der Halsschild viel feiner sculptiert, nur in der vorderen Hälfte mit feiner undeutlich erhabener Mittellinie. Die weissliche Halsschildzeichnung besteht aus einem breiten Streifen auf der Vorderbrust, je einer Linie beiderseits der Mittellinie und über den Vorderhüften, die durch den weissen Vorderrand mit einander verbunden sind und einer in der vorderen Hälfte abgekürzten Linie, die dicht unter den Hinterecken verläuft und von oben daher nicht sichtbar ist. Schildchen lang gestreckt dreieckig, mit feiner Mittelfurche. Flügeldecken gestreift, die Naht und die meisten Spatien mit einer, das 2.–8. Spatium mit verworrenen Punkten. Hinter der Schulter beginnt auf dem 6. Spatium eine weissliche Linie, die hinter der Mitte die Naht durchschneidet und einen halben Kreisbogen bildet, ausserdem ist die Naht, das Basalviertel des 2. und 4., so wie das Apicaldrittel des letzteren weisslich tomentiert, diese letzteren Linien verschmälern sich nach vorn und reichen bis an die Bogenlinie heran. Pygidium grob punktiert, alle Ränder und die Mittellinie weisslich, Seiten der Decken dichter lehmgelb tomentiert. Zweites bis 5. Bauchsternit in der Mitte und an der Seite je mit schwärzlicher Punktmakel, letztes Sternit an der Spitze mit einer solchen. Beine einfarbig weisslich, Schienen mit der üblichen einfachen Punktreihe.

16. **Aphioda integripennis** sp. nov.

Nigra fortiter punctata, indumento cereo tecta; rostro latitudine duplo dimidiaque parte longiore, prothorace fere tertia parte breviore; antennis ante rostri medium insertis, scapo compressiusculo, oculi marginem posticum vix attingente, funi culo scapo breviore, articulo primo crasso secundo longiore, reliquis apicem versus lititudine increscentibus; clava fusiforme, articulis sex praecedentibus unitis longitudine aequali; capite rostri tribus quadrantibus longitudine aequali; prothorace latitudine multo longiore, antrorsum paulo angustato; scutello punctiforme; elytris prothorace plus duplo dimidiaque parte longioribus, basi singulis perpaulo obliquatis, rude striatopunctatis, punctis spatiis multo latioribus, spatio secundo quartoque apicem versus tenuissime carinulatis ac subgranulosis; sutura, stria prima secundaque apice foveato-impressis; femoribus posticis sterniti abdominalis secundi apicem haud attingentibus; abdomine planiusculo, rude punctato, sternito abdominali secundo tribus sequentibus unitis paulo breviore.

Long., 6.5; lat., 1 mm.

LUZON, monte Banahao.

Pascoe [7] beschreibt eine merkwürdige Curculioniden-Gattung, die er mit Fragezeichen zu den Calandriden stellt und von der er die ihm einzige bekannte Art auf pl. VII, fig. I und Ia, abbildet. Nur auf Grund dieser Figuren konnte ich die mir vorliegende Art von den Philippinen als zu dieser Gattung gehörend erkennen, denn ich würde sie eher für eine aberrante Form, mit schmal getrennten Vorderhüften und linearen Schenkeln und Schienen, der Hylobiidæ, etwa bei *Paipalesomus* gehalten haben. Spätere Untersuchungen müssen erst dartun, ob Pascoes Vermutung, dass eine neue zwischen den Campylosceliden und Calandriden einzuschiebende Subfamilie vorliege, Bestätigung findet.

Die nur in einem Exemplar mir vorliegende philippinische Art ist mit einer gelben wachsartigen, schwer zu entfernenden Ausschwitzung dicht bedeckt und unterscheidet sich von *A. diura* sofort durch die an der Spitze gemeinsam abgerundeten Flügeldecken. Die Naht ist sehr wenig verkürzt und in ihrem Spitzenteil tief grubig eingedrückt. Dieser Eindruck sowohl als die ähnlichen Eindrücke an der Spitze des 1. und 2. Punktstreifens werden nach aussen hin von der etwas leistenartig vortretenden Spitze der Naht und des 2. Spatiums begrenzt. Deckenbasis im vergleich zu *diura* sehr wenig abgeschrägt.

CERAMBYCINÆ

17. Halme (?) spinicornis sp. nov.

Fulva, subtiliter remoteque erecte pilosa, femoribus fortiter pedunculato-clavatis, intermediis et posticis in dimidia parte basali, ut tibiis anticis, infuscatis, tibiis intermediis et posticis nigris; elytris apice rotundatis, macula, transversa, postmediana, subcallosa, eburnea; antennis articulo tertio apice spina, oblique introrsum directa, armato; prothorace globoso, irregulariter punctato; cutello, punctisque duobus lateralibus in prothorace ut mesosterni, metasterni et abdominis lateribus, albo-sericeo-maculatis.

Long., 7; lat., 2 mm.

LUZON, monte Banahao.

Gelbbraun, Vorderschienen und Basalhälfte der Mittel- und Hinterschenkel bräunlich, Mittel- und Hinterschienen schwarz, eine querstreifenförmige, schwielige Makel hinter der Deckenmitte elfenbeinweiss. Das Schildchen, zwei Punkte, einer aussen über der Vorderhüfte, der andere in der Mitte des Seitenrandes, die Seitenstücke der Mittelbrust, eine die hintere, äussere Ecke der Hinterbrust und die hintere Hälfte ihrer Seitenstücke ein-

[7] *Journ. Linn. Soc.* (1871), 11, 214.

nehmende Makel weisslich seidenglänzend behaart. Stirn unregelmässig zerstreut punktiert. Fühler vom 5. Glied ab matt und von da nach der Spitze zu an Dicke zunehmend, die Glieder vom dritten ab ohne Längsfurche, das 2. Glied mindestens doppelt so lang wie dick, das 3. beträchtlich länger wie das nur undeutlich punktierte erste und an der Spitze innen mit schräg abstehendem fadenförmigen Dorn, der dem halben Glied an Länge gleichkommt. Flügeldecken entfernt, nach der Spitze zu viel feiner punktiert, die Punkte längs der Naht gereiht punktiert, auch an der Deckenwurzel viel kleiner als ihre Zwischenräume. Schenkel und Schienen wie der ganze Käfer fein lang abstehend behaart, die gebogenen Hinterschienen innen ohne Längsfurchen und Leisten, grob, etwas körnig gereiht punktiert. Tarsen gelbbraun. Die abweichende Form der Fühler dürfte, trotz der sonstigen Uebereinstimmung dieser Art mit *Halme,* später Anlass zur Errichtung einer neuen Gattung geben.

18. Polyphida monticola sp. nov.

P. metallicae Nonfr. affinis sed major, niger subter argenteo, elytris obscure viridi-aeneis fasciatim subaurato-sericeis; antennis articulo primo in fronte longitudinaliter sulcato, quarto aequilongo, tertio duobus sequentibus unitis paulo breviore; prothorace subcylindrico, latitudine distincte longiore, disco ante medium carinula transversa, reliquo sat remote punctato; scutello semicirculari; elytris apice truncato, foris spinoso, in dimidia parte basali manifeste, reliquis subtilius punctatis, in primo triente macula transversa, subimpressa, post medium fascia, foras angustata quintaque parte apicali subaurato-sericeis.

Long., 16; lat., 4 mm.

LUZON, Prov. Bataan, Limay.

Grösser als alle bisher bekannten Arten und in der Färbung der *affinis* Nonfr. (=*feae* Gahan) ähnlich, nämlich schwärzlich, unterseits weisslich seidenglänzend, die Flügeldecken dunkel erzgrün mit gelblichweiss seidenartig tomentierten Querbinden, ausserdem überall spärlich und fein weiss abstehend behaart. Stirn mit feiner Mittelfurche, beiderseits dieser glatt, mit einigen groben Punkten. Erstes Fühlerglied etwas bräunlich, vorn mit einer aussen von einer Leiste begrenzten Längsfurche. Halsschild länger als breit (5×3.5), mit sehr schwach gerundeten, vor der Mitte kaum merklich eingeschnürten Seiten, auf der Scheibe, vor der Mitte, mit einer Querleiste, im übrigen entfernt punktiert. Schildchen halbkreisförmig.[8] Flügeldecken an der

[8] Die Abbildung von *P. feae* Gahan [*Ann. Mus. Genova* (1894), 34, Taf. I, Fig. 8] zeigt ein spitz dreieckiges Schildchen.

Wurzel, besonders der 5. Streifen grob gereiht, nach hinten zu allmählich feiner und da verworren punktiert, ihre Spitze abgestutzt, aussen mit kurzem Dorn. Im basalen Deckendrittel eine leicht eingedrückte Quermakel, hinter der Mitte eine aussen verschmälerte Querbinde und das ganze Spitzenfünftel fein gelblich seidenartig tomentiert. Hinterschenkel die Deckenspitze eben erreichend.

19. **Nericonia glabricollis** sp. nov.

Fusca, parce nigro-, antennis pedibusque albido-ciliatis; abdomine elytrorumque quarta parte apicali nitido-glabris, haud tomentosis; prothorace disco haud tuberculato, nitido glabro; scutello ochraceo, elytris subaurato aut ferrugineo, fasciisque tribus, una obliqua basali ad suturam interrupta, altera antemediana, ad suturam antrorsum producta, tertia, recta, anteapicali, griseo-tomentosis; femoribus fuscis unicoloribus, tibiis nigricantibus.

Long., 6.5; lat., 2 mm.

LUZON, monte Banahao.

Kastanienbraun, die Fühler helbraun, 2.–5. Abdominalsternit und Spitzenviertel der Decken glänzend schwarz, diese im übrigen fein goldig rostgelb tomentiert, mit drei grauen Querbinden, eine schräge basale, die die Naht nicht erreicht, eine nach innen verbreiterte, vor der Mitte, an der Naht nach vorn ausgezogene, und eine gerade, die den schwarzen kahlen, nur spärlich bewimperten Apicalteil vorn begrenzt. Halsschild, mit Ausnahme der fein rostgelb tomentierten Basalfurche, so wie der Kopf glänzend, sehr spärlich schwarz abstehend bewimpert, so lang wie an den Seitenhöckern breit, die Scheibe ohne Höcker, gleichmässig gewölbt. Fühlerschaft die Spitze der Seitenhöcker erreichend, etwas länger als das 3. Glied, das 4. etwas länger als das 3. Schildchen wenig breiter als lang, rechteckig, der Spitzenrand verrundet. Flügeldecken nicht ganz dreimal so lang wie breit (8.3 × 3), oberseits mit 4 groben, in der Deckenmitte erlöschenden Punktreihen. Schenkel einfarbig gelbbraun, so wie die schwärzlichen Schienen spärlich weiss abstehend bewimpert, die Hinterschienen länger als die Hinterschenkel. Seiten der Mittelbrust und die hintere Aussenecke der Hinterbrust weiss tomentiert. Die letzten 5 Fühlerglieder fehlen dem vorliegendem Unicum. Von den zwei bekannten Arten: *N. trifasciata* Pasc. aus Sarawak und *N. morio* Gah. aus Birma u. a. durch die an der Wurzel nicht weiss geringelten Schenkel zu unterscheiden.

20. **Diochares mindanaonis sp. nov.**

Niger, ochraceo-marmoratus, elytris utrinque macula transversa, antemediana, nigro-marmorata; antennis maris corpore duplo longioribus, nigricantibus; vertice, ut in D. fimbriato, lineis tribus ochraceis; prothorace transverso, tuberis lateralibus subacutis, vittis tribus longitudinalibus, mediana sat obsoleta, disco utrinque, ante medium, plaga subelevata, elliptico-transversa, post medium transverse plicato; elytris in triente basali fortius ac subasperato-, reliquis subtiliter remote, humeris granuloso-punctatis, apice anguste truncatis, angulo externo subdentato.

Long., 16–18; lat., 4.5–6 mm.

MINDANAO, Davao (legit *W. Micholitz*).

Eine infolge der geringen Körpergrösse an die Gattung *Epepeotus* erinnernde, lehmgelb und fein marmorierte Art, die aber wegen der an der Basis entfernten Fühlerhöcker zu *Diochares* gestellt werden muss und in der Linienzeichnung des Kopfes und Halsschildes viel Ähnlichkeit mit dem immer viel grösseren *D. fimbriatus* hat. Der Thorax zeigt an den Seiten eine stumpfere Bewehrung, auf der Scheibe beiderseits vor der Mitte eine quere, ovale, wenig erhöhte, geglättete Fläche, hinter der Mitte 1–3 leichte Querrunzeln. Schildchen dicht lehmgelb tomentiert. Flügeldecken in der Apicalhälfte mit Suturalfurche, fein punktartig marmoriert, die dunkle Makel vor der Mitte weder die Naht noch den Seitenrand erreichend, von einer mehr einfarbig lehmfarbigen Zone umgeben. Deckenspitzen schmal abgestutzt, ihre Aussenecke undeutlich zahnförmig. Unterseite und Beine schwarz, sehr fein und spärlich, die Epimeren der Mittelbrust, der Hinterrand der Hinterbrust und der Bauchsternite etwas dichter lehmgelb tomentiert. Pascoe [9] führt auch *D. fimbriatus* von Manila an, von welchem Fundort ich noch kein Exemplar zu sehen Gelegenheit hatte.

21. **Cereopsius irregularis sp. nov.** Tafel I, Fig. 11.

Niger, femoribus anticis basi tibiisque anticis, parte apicali incurvatis, obscure sanguineis; lobo oculari inferiore latitudine altiore; prothorace margine antico posticoque, scutello, elytris, apice truncatis, fascia in primo quarta, fasciisque vermiculosim ac racemosim confluentibus, in dimidia parte apicali, prosterno, mesothoracis episternis sternitisque abdominalibus in margine postico, albo-tomentosis.

Long., 19.5; lat., 5 mm.

[9] *Trans. Ent. Soc. London*, III, 3, 304.

LUZON, monte Banahao.

Von der gestreckten Gestalt des *C. praetorius* Er., der untere Augenlappen aber wie bei *C. varius* mihi [10] deutlich höher als breit, die Vorderschienen in der Apicalhälfte nach innen gebogen, Deckenspitzen breiter und vollkommen gerade abgestutzt, die äussere Ecke kaum merklich zahnartig ausgezogen. Grundfärbung schwarz, Wurzel der Vorderschenkel und die ganzen Vorderschienen dunkel blutrot. Stirn mit haarfeiner Mittelleiste, fein, ein seitlicher Längsstreifen dichter grau tomentiert. Halsschildvorder- und Hinterrand mit weissem Toment, das durch die Randfurche teilweise in zwei Linien gespalten wird. Das quere, verrundete Schildchen, ebenso eine Querbinde im ersten Deckenviertel und unregelmässig verästelt in einander fliessende Quermakeln in der hinteren Deckenhälfte, die Vorderbrust, die Episternen der Hinterbrust und die Spizenränder der Abdominalsternite weiss tomentiert. Die zerstreuten Punkte der Decken sind an der Wurzel etwas raspelartig gekörnt, werden aber nach hinten zu immer feiner und spärlicher. Beine fein grau tomentiert, Mittel- und Hinterschienen auf dem Rücken in der Spitzenhälfte schwarz behaart.

22. **Anancylus strix** sp. nov. Tafel I, Fig. 12.

Fusco-niger, elytris variegatim fusco- nigro- et albido, corpore subter capiteque luteo-squamosis; antennis corpore plus duplo longioribus, brunneis articulis singulis bsi anguste abidis, scapo in fronte longitudinaliter sulcato, articulo tertio subarcuato, scapo aequilongo, articulo quarto distincte longiore; prothorace transverso, remote punctato, luteo tomentoso, maculis fuscis sat symetrice dispositis; scutello transverso-rotundato, utrinque infuscato; elytris intra humeros longitudinaliter subimpressis, linea suturali praesertim in dimidia parte apicali impressa, in triente basali subgranoso-, reliquis apicem versus subtilius punctatis, basi utrinque plaga discali, femoribus tibeesque basi apiceque fusco-, quarta parte basali luteo-, fascia mediana fusco-bifenestrata, altera subapicali racemosa ut tarsis articulis duabus basalibus albo-tomentosis.

Long., 13; lat., 5 mm.

LUZON, monte Banahao.

Obwohl das Mesosternum dieser Art einen stumpfen Höcker trägt, stelle ich sie vorläufig in diese Gattung. Der Kopf ist parallelseitig und die Stirn länglich, die Backen wie bei *A.*

[10] *Abh. u. Ber. Mus. Dresden* (1889–90), Nr. 3, 35, Taf. Fig. 10.

maculosus Auriv.[11] viel höher als der untere Augenlappen und ausserdem der Fühlerschaft vorn der Länge nach gefurcht. Die Färbung ist dunkelbraun, unterseits lehmfarben, oberseits in der aus der Abbildung ersichtlichen Verteilung braun, weiss und ockergelb tomentiert. Die dunklen Makeln auf dem Halsschild und auf den Decken sind schwarzbraun. Sie stehen auf ersterem auf lehmfarbigem, auf letzterem im basalen Viertel auf ocker- bis rostgelbem Grund, die helle durch dunkle Makeln unterbrochene Bindenzeichnung in der Mitte und vor der Spitze ist weiss. Auf der lehmgelben Unterseite ist nur je eine Makel an den Seiten der Hinterbrust und in der Mitte der ihnen anliegenden Episternen so wie die Wurzel und Spitze der Schenkel und Schienen schwarzbraun, alle ersten und zweiten Tarsenglieder oberseits weiss tomentiert.

23. **Cacia xenoceroides** sp. nov. Tafel I, Fig. 13.

Nigricans, corpore subter, prothorace lateribus vittaque mediana, scutello, elytris sutura, margine basali et laterali anguste maculaque transversa antemediana, margine laterali confluenti et infra humeros vittam, parum curvatam, basin versus exmittente, albido-tomentosis; antennis articolo tertio quartoque basi, quinto fere toto albidis, quarto in femina apice subter nigropenicillato; tibiis anticis apice, intermediis et posticis prope basin et ad apicem, femoribus intermediis et posticis macula anteapicali apicalique nigris.

Long., 9–13; lat., 3–5 mm.

LUZON, monte Banahao.

Grauschwarz, Unterseite, Stirn, ein Streifen auf dem Scheitel, drei auf dem Halsschild, das Schildchen, mit Ausnahme der seitlichen Ecken, eine Quermakel vor der Mitte der Decken, die innerhalb der Schulter einen Streifen nach der Deckenbasis zu entsendet, so wie alle Deckenränder weisslich. Fühler schwärzlich, Wurzel des 3.–4. und das 5., mit Ausnahme der schwarzen Spitze, weisslich, das 4. beim Weibchen in der Spitzenhälfte unterseits mit schwarzem Haarbüschel. Halsschildseiten mit zerstreuten Punkten. Flügeldecken gleichmässig gewölbt und nur im Basaldrittel mit sehr zerstreuten, feinen, etwas raspelartig gekörnten, Naht bis über die Mitte hinaus, mit entfernt gereihten Punkten. Die weisslichgraue Zeichnung ist am besten aus der beigegebenen Skizze (Fig. 13) zu entnehmen. Unterseite ganz weisslich, zuweilen das 1. und 2. Abdominalsternit an den Seiten und die Schenkel vor und an der Spitze, die Schienen in der Regel in der Basalhälfte, die Wurzel ausgenommen, schwärzlich.

[11] *Arkiv f. Zool.* (1911), 7, Nr. 19, 16.

24. **Cacia ulula** sp. nov. Tafel I, Fig. 14.

Nigra, ochraceo-tomento, vartice prothoraceque utrinque vitta, elytris fasciis irregularibus duabus, una postbasali, altera mediana, zigzag-forme lineisque vermiculosis in parte apicali fuscotomentosis; antennis nigris, articulo tertio, quarto quintoque basi albido-tomentosis, quarto apice nigro-fimbriato; corpore subter lateribus ochraceo-, medio albido-, marginibus mesoepisternis, metasterni margine laterali, metaepisternis vitta obliqua maculisque in lateralibus in metasterno et in segmentis abdominalibus ut vittis duabus in pygidio et macula mediana et apicali in femoribus, altera antemediana et apicali in tibiis, fuscotomentosis.

Long., 15; lat., 5.8 mm.

LUZON, monte Banahao.

Eine relativ grosse, infolge der Deckenzeichnung an die Gattung *Coptops* erinnernde Art, bei der auf der Unterseite das lehmfarbige Toment vorwiegt, während auf der Oberseite dieses und die schwarzbraunen Stellen ungefähr die gleiche Fläche bedecken. Diese bestehen hauptsächlich aus je einer Längsbinde hinter dem Auge, zwei eben solchen auf dem Thorax, die aber unregelmässig gerandet und durch Makeln unterbrochen sind und aus zwei Zickzackbinden auf den Decken, eine hinter der Wurzel, die andere hinter der Mitte, ausserdem aus verworrenen eine undeutliche und sehr schmale Zickzackbinde bildenden Strichen. Die Mitte der Körperunterseite ist weisslich, die Seiten sind lehmgelb tomentiert, der Rand der Mittelbrustepisternen, der Aussenrand der Hinterbrust, eine Schrägbinde auf den Hinterbrustepisternen, je eine Makel an den Seiten der Hinterbrust und der Abdominalsternite sowie in der Mitte und an der Spitze der Schenkel und eine vor der Mitte und im Spitzendrittel der Schienen, dunkelbraun. Tarsen oberseits weiss, nur die Lappenspitzen des dritten Gliedes schwarz.

25. **Cacia proteus** sp. nov. Tafel I, Fig. 16.

Castanea, subtiliter ochraceo-tomentosa, fronte inter antennarum basi fascia transversa nigricante, vertice prothoraceque utrinque vitta, scutello elytrisque maculis fuscis anguste lividomarginatis, una basali intra humeros, margine postico diluto, altera postmediana obliqua, elliptica (interdum in maculis tribus divisa) et tribus minoribus oblongis, una suturali et duabus marginalibus, plus minusque inter se conjunctis, in apice; Antennis brunneis, articulo tertio quartoque basi anguste, quinto fere toto, apice nigro excepto, albo-tomentosis; fronte sat remote, prothorace parcius, elytris in dimidia parte basali distincte ac

subseriatim in parte apicali subtilius punctatisa corpore subter uniforme luteo-tomentoso, metaepisternis margine inferiore fusco; tibiis in medio late albido-anulatis.

Long., 8.5–10; lat., 3–4 mm.

LUZON, monte Maquiling.

Zwei in der Grösse und Zeichnung abweichende Stücke von der gleichen Örtlichkeit halte ich zu derselben Art gehörend und mit *C. intricata* Pasc. verwandt. Die Grundfärbung ist ein dunkles Rotbraun, die Tomentierung fein lehmfarben, auf den dunklen, am besten aus der Abbildung (Fig. 16) ersichtlichen Makeln, schwärzlich, an deren Rändern weisslichgelb. Während das kleinere Stück dicht hinter der Mitte eine einzige schräg gestellte grosse Makel aufweist, zeigt das grössere an dieser Stelle drei kleine (siehe die Fig. 15). Sie wurde als var. *disjuncta* nov. bezeichnet.

26. **Euclea ruficollis** sp. nov.

Nigra, subtiliter cinereo-tomentosa, prothorace sanguineo, antice haud armato; antennis articulo quarto scapo haud longiore; scutello longitudine fere triplo latiore; elytris punctis pallide ferrugineo-tomentosis, dense adspersis; corpore subter ochraceo-tomentoso, nigro-punctato.

Long., 16; lat., 5 mm.

LUZON, monte Maquiling.

Schwärzlich, Halsschild mit Ausnahme des Vorder- und Hinterrandes rot, oberseits, namentlich in den Punkten, fein weisslich. Unterseite und Kopf mehr lehmgelb tomentiert, die Flügeldecken mit blass rostgelben Punktmakeln dicht bedeckt. Unterer Augenlappen stark quer, deutlich niedriger als der Vorderrand der Backen, Stirn am Vorderrande beiderseits der Mittelleiste mit Eindruck, im übrigen entfernt und grob punktiert. Die basalen vier Fühlerglieder, mit Ausnahme der Spitze des 3. und 4., spärlich weiss tomentiert, das letztere etwas kürzer als das 1. Glied (bei *E. albata* New. viel länger), das 5. halb so lang wie das 4., die folgenden an Länge abnehmend. Halsschild vorn, an den Seiten, unbewehrt, diese ziemlich gerade und nach hinten zu divergierend, seine Oberseite ziemlich entfernt und flach punktiert, die Scheibe mit geglättetem Längsfleck, am Basalrand in der Mitte mit leichtem in der Mitte undeutlich gekieltem Längseindruck. Schildchen fast dreimal so breit wie lang. Flügeldecken der ganzen Länge nach deutlich, aber kaum gereiht punktiert, im Spitzendrittel mit Nahtstreifen. Unterseite blass rostgelb (isabellfarben) tomentiert, mit grossen schwärzlichen Kahlpunkten.

Genus **PROTEUCLEA** novum

Niphonidarum

Differt a genere Euclea: antennis longioribus ac gracilioribus, apicem versus sensim attenuatis ac elytrorum apicem fere attingentibus, articulo quarto quinto vix duplo, articulo quinto latitudine fere quinquiens longiore, articulis quinque ultimis inter se magnitudine parum differentibus.

27. **Proteuclea laterivitta** sp. nov. Tafel I, Fig. 17.

Nigra, omnino ochraceo-tomentosa, supra creberrime, subter punctis nigris parce adspersis; elytris linea laterali, post humeros incipiente, subflexuosa, ante apicem evanescenti, cretaceo-squamosa; antennis nigris, subtilissime ochraceo-tomentosis.

Long., 15; lat., 4.6 mm.

LUZON, monte Banahao.

Schwarz, Abdomen bräunlich, überall lehmgelb tomentiert, unterseits sehr zerstreut, oberseits dichter punktiert, die Punkte mit schwarzen Höfen, die auf der Halsschildscheibe, ausgenommen in der Mittellinie und auf der inneren Deckenhälfte, ausgenommen auf der Naht, fast ganz zusammenfliessen und nur Spuren des lehmgelben Tomentes frei lassen. Deckenseiten mit einem über den Hinterbrustepisternen beginnendem, hinten fein ausgezogenen und drei Viertel der Decken einnehmenden, weiss tomentierten Längsstreifen. Oberlippe und Epistom gelbrot, Stirn grob zerstreut punktiert, mit etwas undeutlicher Mittelleiste, die auf dem Scheitel in eine feine Furche übergeht. Fühler einfarbig schwarz, fein lehmgelb tomentiert, Schaft kaum merklich punktiert, sein freier Teil doppelt so lang wie dick und sehr wenig länger wie das 5. Glied. Halsschild (von der Spitze der Hinterecken ab gemessen) so lang wie breit, Seiten dicht hinter dem Vorderrande mit kurzem spitz konischem Höcker, Mittellinie in der Basalhälfte kahl. Decken gleichmässig zerstreut punktiert, die Punkte an der Deckenwurzel gröber. Hinterschenkel die Mitte des 3. Bauchsternites erreichend und, so wie die anderen, gross schwarz zerstreut punktiert, Schienen einfarbig, 2. Glied der Vordertarsen so lang wie breit.

28. **Xyaste uniformis** sp. nov.

Fulvo-testacea, subtilissime aurato-tomentosa, capite thoraceque plus saturate fulvis; antennis corpore dimidia parte longioribus, articulis tribus basalibus totis, ut quinque ultimis, nigris, reliquis fuscis in dimidia parte apicali nigricantibus, articulo tertio quarto aequilongo; fronte convexa prothoraceque remote

punctatis; scutello transverso-rotundato; elytris latitudine duplo longioribus, apice singulis subrotundatis, unicoloribus, stria suturali, usque ad apicem seriato-punctatis; corpore subter subtilissime parceque aureo-sericeo.

Long., 7–8; lat., 2.5 mm.

LUZON, monte Banahao.

Einfarbig, Kopf, Halsschild und Hinterbrust etwas gesättigter bräunlichgelb, überall fein goldgelb tomentiert. Die Mandibelspitzen, die ersten drei und letzten fünf Fühlerglieder ganz, die übrigen nur in der Spitzenhälfte schwärzlich, das 3. Glied nur so lang wie das 4. Halsschild breiter als lang, an der Basis etwas schmäler als am Vorderrand, vor der Wurzel sehr schwach eingeschnürt, zerstreut punktiert und wie bei *Serixia* und den folgenden Arten die Scheibe hinten in einem dem Schildchen zugekehrten geglätteten, verrundeten Höcker übergehend. Flügeldecken doppelt so lang wie breit, mit Nahtstreifen, bis zu den einzeln schwach abgerundeten Spitzen hin, daselbst aber feiner gereiht punktiert, zwischen der 1. und 2. Punktreihe mit verworrenen Punkten, vom 2. Streifen ab die Zwischenräume breiter als die Punkte. Unterseite sehr fein und spärlich goldgelb tomentiert, mit zerstreuten längeren etwas abstehenden goldgelben Haaren.

Ich stelle dies und die folgenden Arten in diese Gattung weil sie mir wegen der relativ langen Fühler, trotzdem das 3. Fühlerglied nicht verdickt ist, mir näher mit ihr als wie mit *Serixia* verwandt scheint.

29. **Xyaste varioscapus** sp. nov.

Fulvo-testacea, elytris sericeo-tomentosis, apice nigricantibus; antennis maris corpore plus duplo, feminae paulo longioribus, nigricantibus, scapo basi apiceque, interdum solum in dimidia parte basali fulvo, articulo quarto in dimidia parte basali testaceo; prothorace transverso, remote punctato, margine apicali basali paulo latiore, vitta mediana in dimidia parte basali haud punctata; scutello transverso; elytris stria suturali simplici, reliquis seriato-punctatis, punctis ad basin majoribus in triente apicali evanescentibus.

Long., 6–8; lat., 1.5–2 mm.

LUZON, montibus Maquiling et Banahao.

Blass bräunlichgelb, Thorax und Kopf etwas mehr rötlichgelb, Apicalhälfte der Mandibel, die Fühler mit Ausnahme der Wurzel und zuweilen auch der Spitze des 1. und der Basalhälfte des 3. Gliedes so wie das Spitzenfünftel der Decken schwärzlich. Fühler des Männchens mindestens doppelt so lang, beim Weibchen

nur wenig länger als der Körper, ihr Schaft rötlich gelbbraun, gewöhnlich nur im mittleren Teil schwärzlich geringelt, zuweilen jedoch in der ganzen Apicalhälfte schwarz, das 3. Glied länger als der Schaft, das 4. in der Basalhälfte, zuweilen auch die Wurzel des 5., bräunlichgelb. Stirn mit haarfeiner Mittellinie, beiderseits zerstreut punktiert. Halsschild quer, nach vorn deutlich verbreitert, unregelmässig zerstreut punktiert, in der Basalhälfte mit unpunktierter Mittelschwiele. Flügeldecken dreimal so lang wie breit, gereiht punktiert, die Punkte in der Apicalhälfte verschwindend, dichter und heller als Kopf und Thorax, gelblich seidenartig tomentiert, ihr schwarzer Spitzenteil vorn ziemlich gerade abgegrenzt. Unterseite einfarbig, zart seidenartig tomentiert, die Hinterschenkel das 4. Abdominalsternit deutlich überragend.

30. **Xyaste trigonocephala** sp. nov. Tafel I, Fig. 18 und 19.

Praecedenti, varioscapo, verisimilis, sed fronte triangulariter dilatata, antennis articulis quatuor basalibus fulvis, scapo medio nigro-anulato; elytris macula nigra subapicali, transversa tibiisque in dimidia parte basali margine externo nigris; femoribus posticis pygidii apicem attingentibus.

Long., 8; lat., 2 mm.

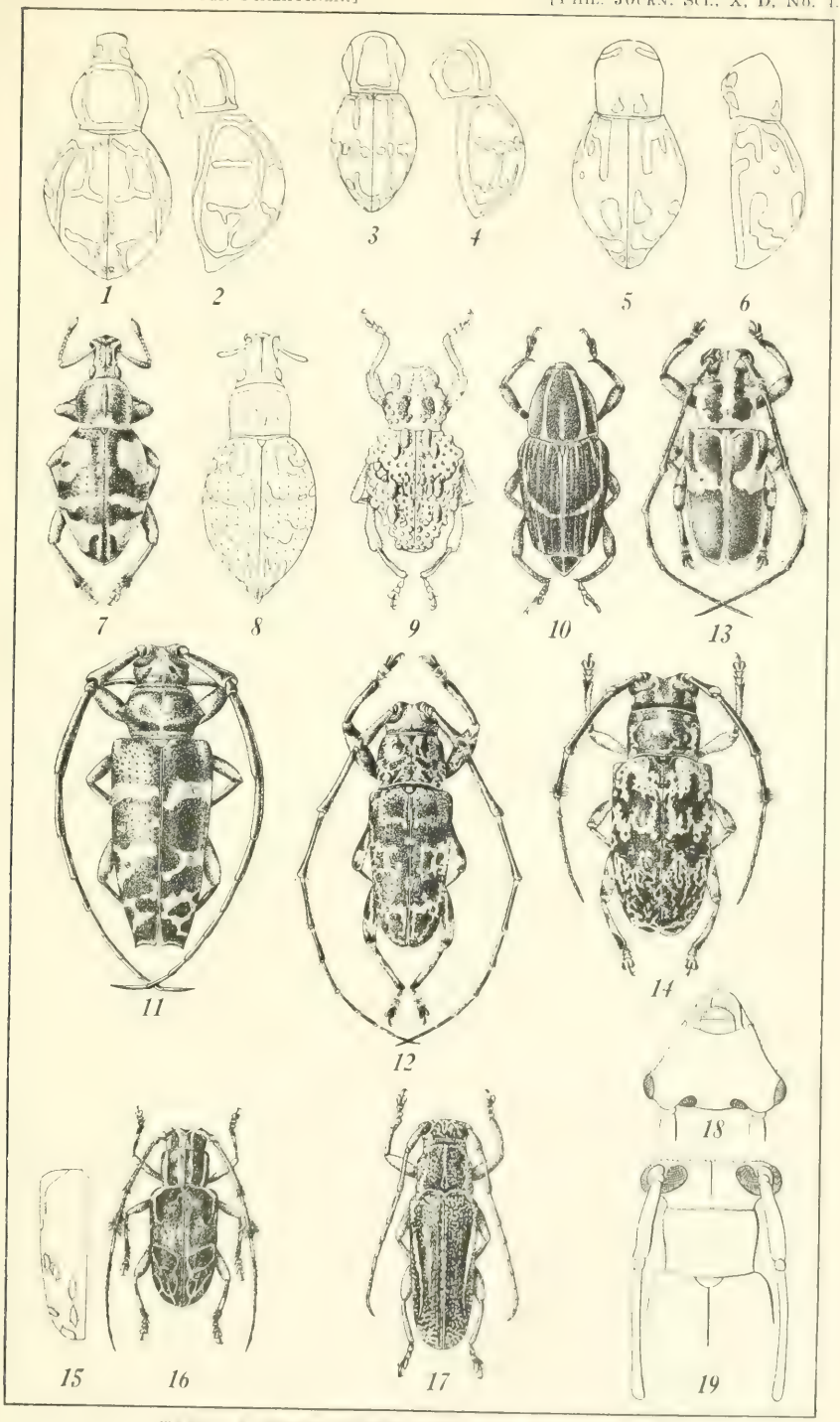
LUZON, monte Banahao.

Der vorigen Art sehr ähnlich, der Kopf aber (von vorn gesehen) zu einem gleichseitigem Dreieck verbreitert, dessen Aussenecken die unteren Augenlappen bilden. Die ersten vier Glieder der Fühler vorwiegend rötlichgelb, der Schaft kürzer als das 3. Glied, in der Mitte mit schrägem schwarzen Ringel, äusserste Spitze des 3. und das Spitzenviertel des 4. Gliedes, so wie der Vorderrand der Vorderschienen, in der Basalhälfte und eine undeutliche Makel an der Deckenspitze schwärzlich. Hinterschenkel die Spitze des Abdomens erreichend. Abdomen, namentlich aber die Episternen der Hinterbrust, dicht gelblichweiss seidenartig tomentiert.

TAFELERKLÄRUNG

Tafel I

Fig. 1, 2. *Metapocyrtus pachyrrhynchoides.* Umriss des Thorax und Dekkenzeichnung von oben und von der Seite.
3, 4. *Metapocyrtus bakeri.* Dergleichen.
5, 6. *Eupyrgops banahaonis.* Dergleichen.
7. *Polycatus eupholoides* ♂.
8. *Polycatus eupholoides* ♀. Umriss des Thorax und Deckenzeichnung.
9. *Poropterus bengueticus.* Umrisszeichnung.
10. *Cercidocerus curvaturatus.*
11. *Cereopsius irregularis.*
12. *Anancylus strix.*
13. *Cacia xenoceroides.*
14. *Cacia ulula.*
15. *Cacia proteus* var. *disjuncta.* Linke Flügeldecke, im Umriss.
16. *Cacia proteus.*
17. *Proteuclea laterivitta.*
18. *Xyaste trigonocephala.* Kopf, Umriss von vorn.
19. *Xyaste trigonocephala.* Kopf, Thorax und Deckenwurzel, im Umriss.



TAFEL I. NEUE KÄFER VON DEN PHILIPPINEN.

TWO AMPHIPODA OF LUZON

By C. F. Baker
(*From the College of Agriculture, Los Baños, P. I.*)

THREE PLATES

The great, shallow, fresh-water lake of central Luzon, Bay Lake, connected with the sea by Pasig River, possesses a fauna of unusual interest. For example, the curious water snake (*Chersydrus granulatus* Schneider) is common, and the fishermen sometimes use its blood to dye their nets. A shark is said to occur in the lake. Its waters possess a marvelously rich plankton and swarm with crustaceans. The bottom is occupied by vast colonies of univalve and bivalve mollusks. Fresh-water sponges are abundant. Finally, under débris along its shores are to be found amphipods and isopods.

The amphipods found here are of very peculiar interest, for the reason that a few miles distant, at an altitude of 1,060 meters on Mount Maquiling, in the mossy forest, occurs a closely related but very distinct species of the same genus, *Parorchestia*. Search in streams between these two stations has so far failed to produce amphipods. The beach form lives at water margin, the mountain form under stones in the dripping mossy forest. The beach form has short antennæ and fully developed pleopods, while the mountain form has long antennæ and reduced pleopods. The heavier armature of the uropods in the mountain form may be an adaptation to the terrestrial life. In form of perion, pleon, and pereiopods, the two species are very much alike.

These two species are clearly Talitridæ by the palpless mandible and the third uropod of one ramus. Likewise they belong to the genus *Parorchestia* of Stebbing by the distinct and non-unguiform fourth joint of the palp of the maxillipeds and by the simple two-jointed third uropod. In both species the pleopods decrease very rapidly in size from first to third, though otherwise they are normal. *Talitroides* of Bonnier, found in a conservatory at Ghent, probably came from some tropical forest, and must be very close to *Parorchestia*, if not synonymous with it, since in one of our species the pleopods are reduced, though still normal.

Parorchestia tenuis (Dana) was found in New Zealand "among roots of grass and in small stream." *Parorchestia hawaiensis* (Dana) is from the Hawaiian Islands. *Parorchestia sylvicola* (Dana), also from New Zealand, was found in "moist soil in the bottom of the extinct volcano of Taiamai, far from the sea." Curiously enough our mountain form comes from the bottom of an extinct crater, and both of our forms are most nearly related to *P. sylvicola.*

Other talitrids have been reported from tropical forests, usually from high altitudes. *Chiltonia mihiwaka* (Chilton) comes from high mountain streams in New Zealand, but *Chiltonia* has antennæ I and II of equal length and uropod III 1-jointed. *Orchestia rectimana* (Dana) is from high altitudes in Tahiti; *O. montana* Weber, from high altitudes in Celebes; *O. parvispinosa* Weber from high altitudes in Java; *O. humicola* Marts. is a terrestrial species from Japan; and *O. bottae* M. E. has been found in Holland, remote from the sea. Likewise *Talitrus* furnishes several terrestrial species, as, *T. sylvaticus* Hasw. from New South Wales and Tasmania, *T. allaudi* Chevr. from Seychelles, and *T. gulliveri* Miers from Rodriguez Island. But *Orchestia* and *Talitrus* are both characterized by a wanting or rudimentary fourth joint of palp of maxilliped. It seems, from the specific descriptions, as if a number of the terrestrial talitrids, especially those from high altitudes, should be reëxamined as to their generic relationships to *Parorchestia.*[1]

Following Stebbing, in the "Amphipoda Gammaridea" of Das Tierreich, the species, including our two new Luzon forms, may be arranged as follows:

Genus **PARORCHESTIA** Stebbing

Synopsis of species.

a^1. Antennæ I with third joint of peduncle shorter than second, flagellum 5- to 6-jointed; uropod I, outer ramus without marginal spines; telson apically with groups of spinules..... P. tenuis (Dana).

a^2. Antennæ I with third joint longer than second; telson apically without[2] groups of spinules.

b^1. Antennæ I with joints (7-jointed) of flagellum unusually elongate, third joint of peduncle longer than first and second together; uropod I, outer ramus without marginal spines..... P. hawaiensis (Dana).

b^2. Antennæ I with joints of flagellum not very elongate, third joint of peduncle shorter than first and second together.

[1] In this connection the student should carefully examine a paper on similar amphipoda recently published in Indian Museum Notes.

[2] Certainly without groups of spinules in *P. luzonensis* and *P. lagunæ*, and not mentioned for *P. hawaiensis* or *P. sylvicola.*

c^1. Antennæ I with flagellum (8-jointed) longer than peduncle; uropod I, outer ramus without marginal spine; telson slightly notched at tip ..... P. sylvicola (Dana).

c^2. Antennæ I with flagellum (3- to 4-jointed) distinctly shorter than peduncle; telson entire at tip.

d^1. Antennæ I with flagellum 3-jointed; antennæ II not as long as head and first three segments of pereion together, joints (14) of flagellum thick; uropod I, outer ramus without marginal spines, the rami longer than peduncle; lower lip deeply simply lobed ..... P. lagunæ sp. nov.

d^2. Antennæ I with flagellum 4-jointed; antennæ II surpassing pereion, joints (18) of flagellum slender; uropod I, outer ramus with marginal spines, the rami shorter than peduncle; lower lip very shallowly lobed and with rudiments of inner lobes.

P. luzonensis sp. nov

Parorchestia luzonensis sp. nov.

Color pale olive-green; eyes large, round, black. Side plates subuniform, with lower margins in line.

Antenna I (Plate I, fig. 7) with third joint of peduncle about same length as second; flagellum shorter than peduncular joints 2 and 3 together, 4-jointed, the third joint longest. Antenna II (Plate I, fig. 8) surpassing the pereion, third joint of peduncle longer than first two together; flagellum about once and a half the length of peduncle, about 18-jointed, the joints slender. Maxilla I (Plate I, fig. 11) with inner plate about three fourths the length of outer plate, narrowly rounded at tip, with an inner terminal fringe of soft hairs; outer plate with about six long, curved teeth, the surface of which is denticulated; palp with a tuft of spines at tip. Maxilla II (Plate I, fig. 5) with inner plate acute. Lower lip (Plate I, fig. 6) shallowly lobed and with rudimentary inner lobes. Gnathopod I in ♀ (Plate II, fig. 3) with joints 5 and 6 subequal in length, the sixth with an inner, terminal, rectangular laminate epiphysis, which the small finger does not nearly equal. Gnathopod II (Plate II, fig. 1) in ♀ with joint 5 very slightly shorter than 6, joint 6 nearly three times as long as wide and with three tufts of spinules on outer margin; the finger equals the oblique palm. Pereiopod 5 but little longer than 4, but both 4 and 5 much longer than 3. Pleopods not half the size of those of *P. lagunæ*, but otherwise normal. Uropods I and II (Plate II, fig. 4) with ramus joint small and with two terminal spines, the peduncle much longer than broad. Telson (Plate II, fig. 5) narrowly rounded at tip, entire, and with few weak spines.

Length, 8–9 mm.

LUZON, Laguna Province, summit of Mount Maquiling, in the extinct crater, under stones. This locality is in the dripping

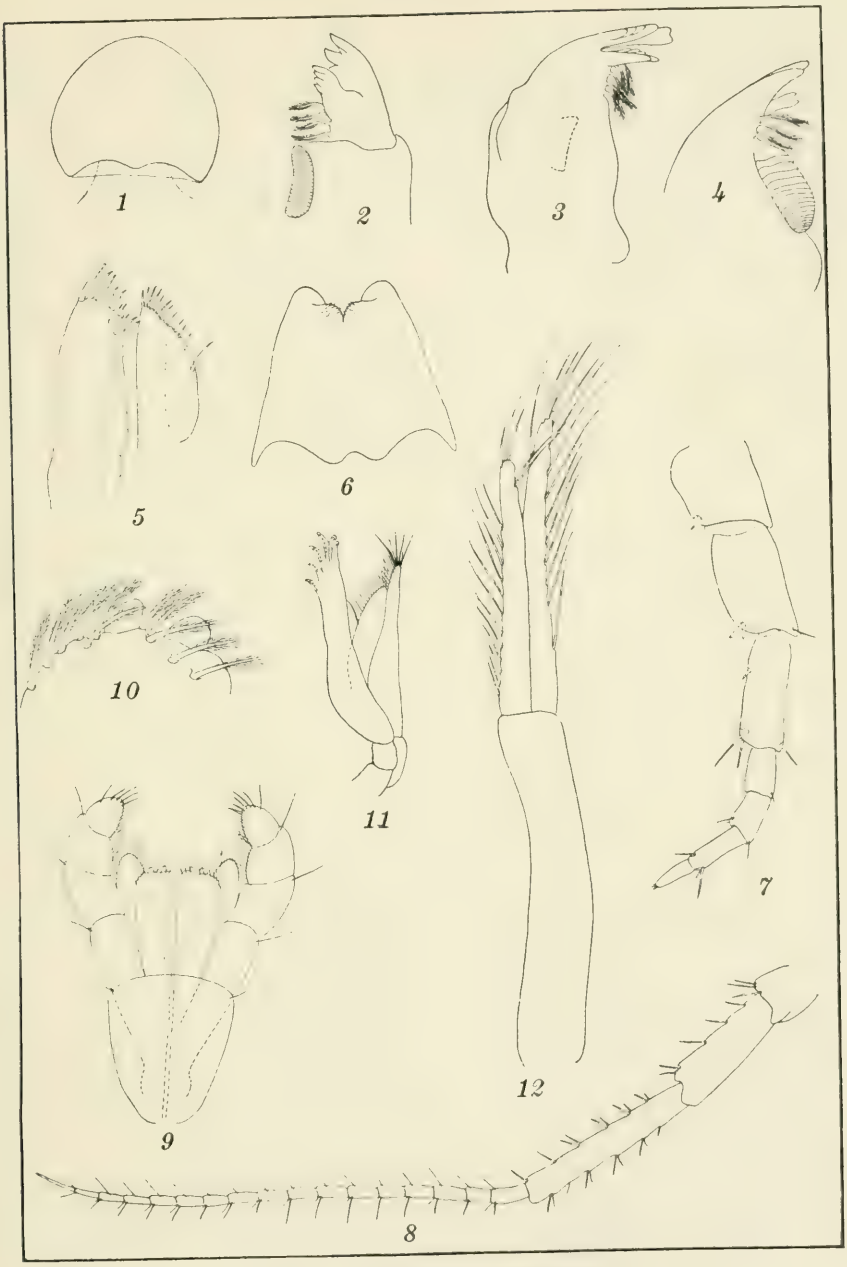


PLATE I. PARORCHESTIA LUZONENSIS.

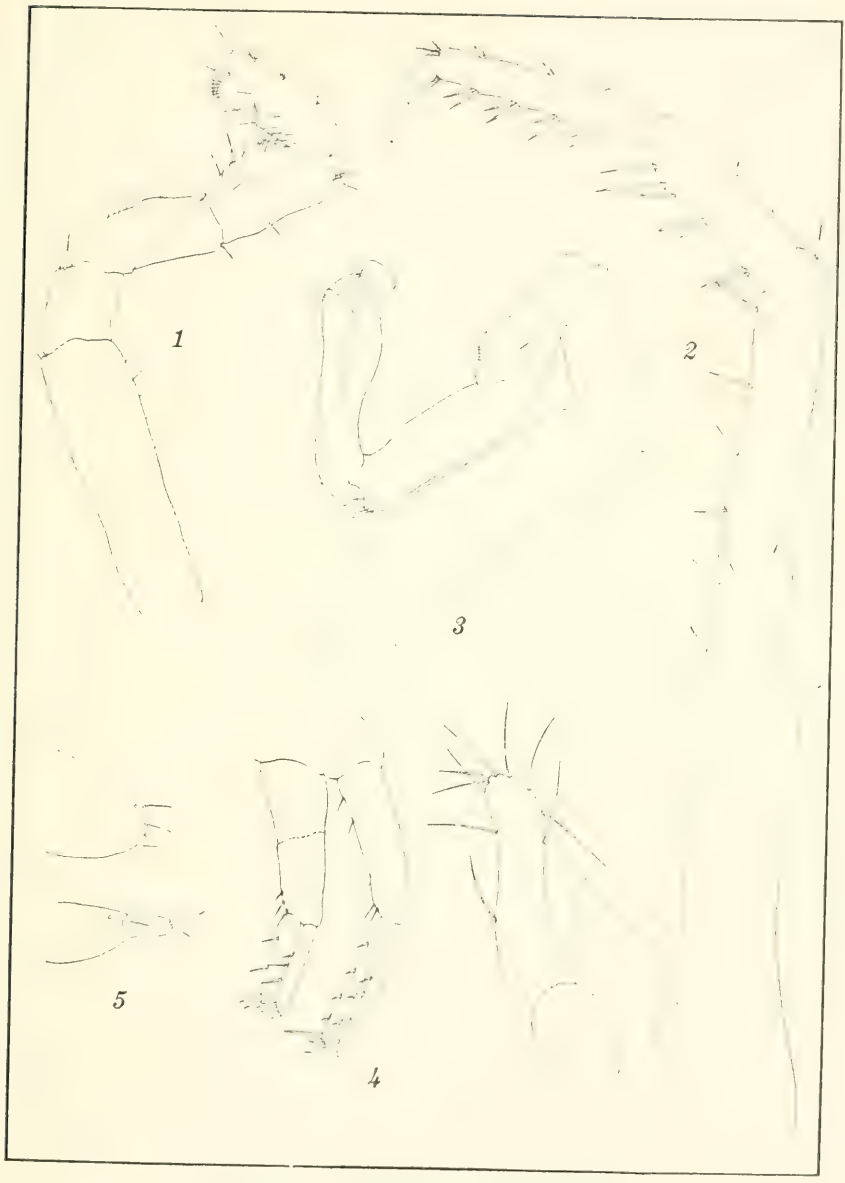


PLATE II. PARORCHESTIA LUZONENSIS.

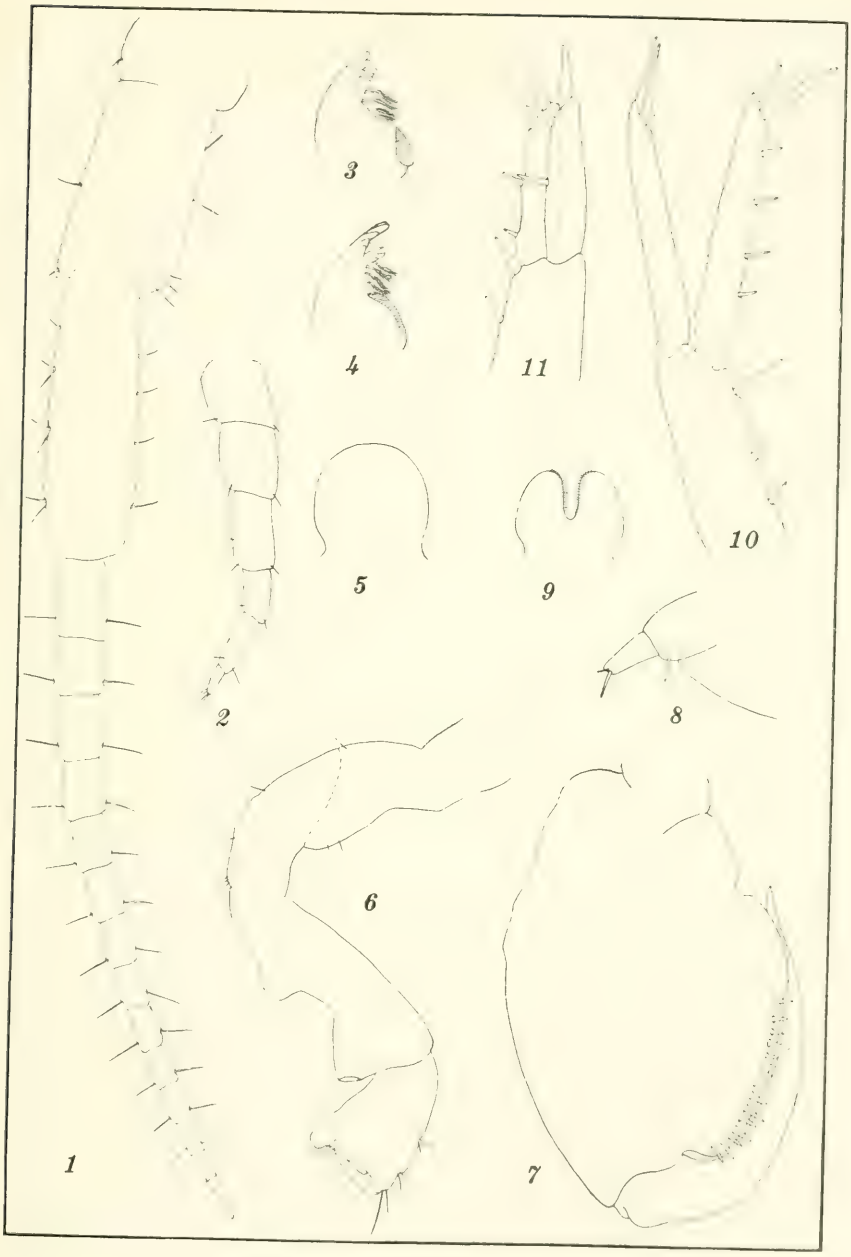


PLATE III. PARORCHESTIA LAGUNÆ.

CEYLONESE AND PHILIPPINE PSYLLIDÆ (HOMOPTERA)

By D. L. Crawford
(*Pomona College, Claremont, California*)

ONE PLATE

The tropics of the Old World contain a host of interesting insects, and many of them are still unknown to science. Two small collections of Psyllidæ, or jumping plant lice (Homoptera), have been recently received by me from two distinct parts of the eastern tropics. One is from the Philippine Islands, sent by Prof. C. F. Baker, of the College of Agriculture at Los Baños, and the other is from Ceylon, sent by Mr. Andrew Rutherford, of Peradeniya. It is not surprising that some of the species are found in both of these regions, and that several species in each are very closely related to species in the other. A few species of psyllids seem to be widely distributed throughout all the Asiatic tropics, such as the citrus psyllid, *Euphalerus citri* (Kuwayama).

These two collections are not treated separately, for there are several species identical in both. The Philippine collection contains 23 species, most of which are new. The Ceylon collection contains 4 species, one of which has already been described from the Philippines, another is closely related to a Bengalese species, and a third resembles another Philippine species.

The descriptions of several species, mostly of the genera *Psylla* and *Trioza*, are deferred until a later date.

The type specimens are retained in my collection, awaiting later disposal.

A synoptic key of the genera thus far known to occur in the Philippines is presented for facilitating the determination of species. There are several other genera doubtfully represented by a few undescribed insects in the collections before me, but these will be added to the key at a later date. Also there are several other genera in Formosa, Japan, and southern Asia which may have representatives in the Philippine Islands as well. This key, therefore, is simply temporary.

Synopsis of the Philippine genera of Psyllidæ.

a^1. Head deeply cleft in front between antennal bases. Antennæ very thick at base and attached at apex of lobes, increasing the cleft appearance. Genæ may be produced beneath into lobes or cones.

b^1. Antennæ very slender and long, not hairy. Vertex with a pair of horns between eyes. Genal cones wanting..... Dynopsylla.

b^2. Antennæ very thick and often long, densely clothed with long hairs. Vertex without horns. Genal cones present, may be small or large. **Homotoma.**

a^2. Head not deeply cleft, as above, and antennæ not thickened so conspicuously. (Genal cones may give appearance of a cleft head, but antennæ are not attached to their apices.)

b^1. Genal cones wanting.

c^1. Wings broad and more or less angular at the apex; vertex rather smoothly and uniformly rounded down in front. Antennæ short, not much longer than width of head. Thorax usually very thick and robust ..... **Pauropsylla.**

c^2. Wings ovate, rounded at apex, smaller; vertex less smoothly rounded down in front, sometimes flattish. Antennæ relatively a little longer. Thorax not strongly arched, often pubescent. **Paurocephala.**

b^2. Genal cones present.

c^1. Head as in *Pauropsylla*, but with small or large genal cones far underneath, projecting down or forward. First marginal cell much larger than second..... **Calophya.**

c^2. Head not as above; cones not far underneath.

d^1. Cubital petiole (stem of media and cubitus) present. First tarsal segment with 2 spines at apex.

e^1. Genal cones very long, longer than vertex, pointing forward. **Epipsylla.**

e^2. Genal cones shorter, pointing downward obliquely or vertically.

f^1. Genal cones continuing in plane of vertex, broad and rounded. **Euphalerus.**

f^2. Genal cones depressed below plane of vertex and not continuing in same line, usually tapering to a point..... **Psylla.**

d^2. Cubital petiole wanting, media and cubitus arising together from basal vein. First tarsal segment without spines at apex.

e^1. Dorsum scarcely arched; pronotum long and not depressed below level of mesonotum and vertex..... **Megatrioza.**

e^2. Dorsum arched; pronotum short and distinctly depressed.

f^1. Genal cones long, slender, not at all divergent, pointing forward or down. Body slender..... **Neotriozella.**

f^2. Genal cones divergent, thicker, usually pointing down.. **Trioza.**

Genus **PAUROPSYLLA** Rübsammen

Body usually short and thick. Head short, without genal cones. Antennæ short. Wings usually broad, hyaline, or maculated. Insect usually gall-forming. Species mostly tropical.

Pauropsylla triozoptera Crawford.[1]

One female from Mount Maquiling, Luzon, P. I. (*Baker*).

Pauropsylla bakeri sp. nov. Plate I, fig. *f*.

Length of body, 1.9 millimeters; length of forewings, 2.6; width, 1.4; width of head, 0.7. General color chocolate brown to

[1] *This Journal, Sec. D* (1913), **8**, 296.

black; mesosternum and legs, except tibiæ and hind femora, yellowish brown; surface of vertex and thorax finely reticulated.

Head nearly as broad as thorax, short; vertex convexly rounded downward, very finely pubescent, with posterior ocelli somewhat elevated; frons mostly covered by genæ; antennæ a little longer than width of head, slender; terminal setæ short.

Thorax thick and very robust as in congeners, but pronotum and prosternum much smaller and partly covered by mesothorax; legs moderately long and slender; wings large, hyaline, nearly half as broad as long, broadest subapically; first marginal cell twice as large as second.

Abdomen rather short and thick; female genital segment not quite as long as rest of abdomen, subacute at apex; dorsal valve a little longer than ventral.

Described from one female, collected on Mount Maquiling, Luzon, P. I. (*Baker*). This is very close to an Indian (Bengalese) species, *Pauropsylla depressa* Crawford.[2]

Pauropsylla floccosa sp. nov. Plate I, fig. *j*.

Length of body, 0.9 millimeter; length of forewing, 1.2; width, 0.4; width of head, 0.25. General color light brown, with lighter spots and streaks; legs lighter colored. A very small species.

Head as broad as thorax, short; vertex rounded down in front, but less evenly so than in some congeners, with posterior ocelli not much elevated; frons, with its ocellus, visible as a small, narrow sclerite to clypeus; antennæ somewhat longer than width of head, slender; terminal setæ much longer than two terminal segments.

Thorax moderately robust; legs relatively rather long and slender; wings hyaline, with a whitish tinge, brownish in apical half, rather small, broadly rounded, about twice as long as broad; veins spotted with brown; venation somewhat similar to that of *P. tuberculata* Crawford, a Bengalese species, but the first marginal cell is much larger relatively.

Abdomen small; third and fourth tergites rather prominent. Male genital segment small; forceps relatively long and slender, as long as genital segment; anal valve as long as forceps, larger, simple. Female genital segment nearly as long as rest of abdomen, acutely pointed at apex.

Described from 17 males and females collected at Peradeniya, Ceylon (*Rutherford*), on leaves of *Aglaia roxburghiana*. "The leaf is inrolled along the edge from below upward. The nymphs

[2] *Indian Mus. Rec.* (1912), 7, pt. 2, 429.

are enclosed in a woolly covering of wax. Some Chalcid parasites emerged from the material (*Psylledontus secundus* Girault n. sp.)."

This species bears a close resemblance to the Bengalese species referred to above, *Pauropsylla tuberculata* Crawford,[3] which was taken on leaves of *Alstonia scholaris*, but the Ceylonese species differs markedly in being much smaller, in having ovate wings with a whitish tinge and brown spots and venational difference as noted above, and a longer female genital segment.

A single mutilated female specimen from Butuan, Mindanao, P. I. (*Baker*), resembles very closely both of these species and more closely the Ceylonese species, although its size is somewhat larger. A description of this, however, is deferred until more material becomes available.

Pauropsylla spondiasæ sp. nov. Plate I, fig. *g*.

Length of body, 1.5 millimeters; length of forewing, 2.1; width, 1.3; width of head, 0.7. Head and thorax dark brown; legs, abdomen, and antennæ except apical segments greenish yellow or light brown; wings yellowish.

Head very short, not quite as broad as thorax, rounded down in front uniformly, with posterior ocelli a little elevated, finely pubescent; frons not wholly covered by genæ, but largely so; antennæ not longer than width of head, slender, with terminal setæ longer than 2 terminal segments.

Thorax very thick and strongly arched, surface reticulated; legs short; wings large and broad, scarcely twice as long as broad, broadest near apex, hyaline but with yellowish tinge, with a pterostigma; marginal cells rather large.

Abdomen short, thick. Male: Forceps rather long, curved forward, tapering to a point, pubescent. Anal valve shorter than forceps, erect, narrow. Female genital segment not as long as rest of abdomen, dorsal valve blunt, short; ventral valve longer, acutely pointed and curved upward.

Described from two males and two females from Peradeniya, Ceylon (*Rutherford*), taken from galls on leaves of *Spondias mangiferæ*. "Leaves inrolled on the margins."

Paurocephala psylloptera Crawford.[4]

One female from Los Baños, P. I. (*Baker*), and 23 males and females collected in Peradeniya, Ceylon, May 24, 1914, on young shoots of *Ficus hispida* and *Ficus asperrima* (*Rutherford*). An

[3] Ibid. (1912), 7, pt. 2, 430.
[4] *This Journal, Sec. D* (1913), 8, 294.

accompanying note states that "these insects are attended by ants. The nymphs excrete a long filament of white wax."

Paurocephala orientalis sp. nov. Plate I, fig. *i*.

Length of body, 1 millimeter; length of forewing, 1.5; width, 0.7; width of head, 0.3. General color light brown to yellowish. Antennæ black at tips.

Head about as wide as thorax, short; vertex rather flat, slightly concave on each side of median line, posterior ocelli slightly elevated, emarginate in front at median suture; frons not covered by genæ, visible as a narrow sclerite from front ocellus to clypeus; genal cones wanting; antennæ about one and one-half times as long as width of head, slender; terminal setæ short.

Thorax moderately arched; legs rather short; wings hyaline, with a yellowish tinge, rounded broadly at apex; pterostigma small; cells elongate.

Abdomen small. Male: Forceps nearly as long as anal valve, broadened at apex; anal valve rather narrow and short. Female genital segment as long as rest of abdomen, thick; dorsal valve longer than ventral, both subacute.

Described from one male and one female from Los Baños, P. I. (*Baker*).

This species differs somewhat from the typical species of the genus in having the vertex a little more flattened, in this resembling species of *Aphalaroida*, an American genus.

Genus **CALOPHYA** Loew

The genus *Calophya* belongs to the subfamily Pauropsyllinæ[5] and is represented in Asia and the Orient by several species, four of which are Japanese. It differs from the related genera in that the members have the genæ produced into short or long conical processes which are situated far back under the head.

Calophya luzonensis sp. nov. Plate I, fig. *k*.

Length of body, 0.7 millimeter; length of forewing, 1.2; width, 0.6; width of head, 0.25. Head and thorax dark brown or black; abdomen, legs, antennæ, and genal cones yellowish to green. Wings hyaline.

Head small, short, nearly as broad as thorax, rounded down in front, surface smooth, posterior ocelli only a little elevated; frons covered by genæ; genal cones slender, acute, as long as 2 basal antennal segments, well separated and divergent; an-

[5] *Bull. U. S. Nat. Mus.* (1914), No. 85, 42.

tennæ short, about two thirds as long as width of head, terminal setæ about as long as antennæ.

Thorax thick, strongly arched, surface finely reticulated. Legs short and small. Wings clear, transparent, rounded at apex. First marginal cell much larger than second.

Abdomen small, short. Male: Forceps very small and slender, acutely pointed; anal valve longer, thicker. Female genital segment thick, not as long as rest of abdomen; apex abruptly and acutely pointed.

Described from one male and one female from Mount Maquiling, Luzon, P. I. (*Baker*).

This species is rather closely related to a Japanese species, *Calophya nigridorsalis* Kuwayama, differing primarily in characters of the genal cones and forewings.

Genus **HOMOTOMA** Guérin

The members of the genus *Homotoma* seem to be mostly tropical in their distribution. The very thick and densely hirsute antennæ are very characteristic of the genus. The genæ are produced beneath into broadly rounded cones or prominent swellings. The wing venation is usually peculiar.

Homotoma radiatum Kuwayama is a Japanese species, while *H. distincta* Crawford is a closely related Bengalese species. Two new species are added now from the Philippine Islands.

Homotoma pacifica sp. nov. Plate I, fig. *b*.

Length of body, 3.7 millimeters; length of forewing, 4.6; width, 1.5; width of head, 0.7. General color glossy black; tibiæ and tarsi brown; wings hyaline, veins black and margined with black; body surface, legs, antennæ, and wing veins clothed with prominent black hairs; the dorsum and antennæ very conspicuously hirsute.

Head not as broad as thorax, not deflexed; vertex somewhat cleft in front, concave on each side of median suture, posterior ocelli somewhat elevated; frons covered by genæ; genæ swollen beneath, but not strongly conical; antennæ very thick, very hirsute, five sixths as long as forewings, 2 basal segments very thick, remainder thinner, but very much thicker than in species of other genera, somewhat carinate.

Thorax not strongly arched, surface glossy but hirsute; pronotum long and prominent; legs short, thick, and hairy; wings long, relatively rather slender, hyaline, with black veins and black margins on veins, acute at apex; marginal cells long and large; radial sector short.

Abdomen very long and slender, shining black; male genital segment small; forceps nearly as long as anal valve, slender, apical half a little slenderer than basal, not acute at apex; anal valve slender, tapering to a narrowly rounded end.

Described from one male from Mount Banahao, Luzon, P. I. (*Baker*).

Homotoma bakeri sp. nov. Plate I, fig. *c*.

Length of body, 3.1 millimeters; length of forewing, 5.6; width, 2.5; width of head, 0.9. General color shining black; venter of thorax and head reddish brown; wing veins black and margined with black; body surface conspicuously hairy.

Head as in *H. pacifica*, but more deeply cleft in front, genæ less swollen and produced into 2 small, blunt cones. Antennæ less thick, not carinate, wholly terete, only about three fourths as long as forewings.

Thorax more strongly arched, hairy. Legs short and thick. Wings very large, broad, acute at apex, hyaline, but veins black and margined with black; venation suggestive of *H. radiata* Kuwayama, but quite different, first marginal cell very small; second very large; fourth furcal (M 1+2), adjacent to radial sector, and practically fused therewith and thence with costal margin to apex of wing.

Abdomen short and thick; genital segment thick, as long as rest of abdomen; dorsal valve a little longer than ventral, subacute at apex.

Described from one female from Mount Maquiling, Luzon (*Baker*).

Dynopsylla minor sp. nov. Plate I, fig. *a*.

Length of body, 3 millimeters; length of forewing, 4.3; width, 1.6; width of head, 0.8. General color light brown to brown with spots and streaks of yellowish to brownish yellow on body, legs, antennæ, and wings.

Head not as broad as thorax, deeply cleft with front ocellus at bottom of cleft and just visible from above; vertex concave, sparsely hairy, with horns a little smaller than in *D. cornuta*, but rather prominent; eyes large; genæ somewhat swollen, covering frons; antennæ about four fifths as long as forewing, very slender, 2 basal segments thicker.

Thorax broad, large, well arched, very sparsely hairy; legs of medium length, rather thick; hind tibiæ with a spur at base and several conspicuous spines at apex; wings elongate, acute, hyaline; venation suggestive of the genus *Carsidara*.

Abdomen rather long. Male forceps cultrate in shape, posterior edge sharp, apex truncate; anal valve twice as long as forceps, thick at base and tapering to a blunt apex.

Described from one male from Los Baños, Luzon, P. I. (*Baker*).

This species resembles the American species of *Carsidara* in wing venation, but is allied to *Dynopsylla cornuta* Crawford [6] in the shape of the vertex and genæ and in the presence of the vertex horns. In the larger species the hind tibiæ are not spurred at the base, but this was stated to be a less important character. However, it is apparent that *Dynopsylla* and *Carsidara* are closely related.

A Japanese species, *Mesohomotoma camphorae* Matsumura, is also closely allied to this species and is, perhaps, congeneric.

Genus **MEGATRIOZA** novum

Allied to *Leuronota;* dorsum scarcely arched; pronotum long, not or only slightly depressed below level of mesonotum and vertex; head long, not deflexed; genal cones long, directed forward; legs long; hind tibiæ armed with a spur at both base and apex, and several large spines at apex; wings long, acute at apex, triozine in venation.

Type of genus: *Megatrioza armata* sp. nov.

Megatrioza armata sp. nov. Plate I, fig. *d*.

Length of body, 3.5 millimeters; length of forewing, 6.7; width, 2.1; width of head, 0.8. General color light to yellowish brown; eyes dark. Body elongate, surface covered with long pale hairs.

Head not quite as broad as thorax, long, not much deflexed; vertex somewhat concave between posterior ocelli; front ocellus visible from above; genal cones longer than vertex, divergent, thickest midway between base and apex, tapering to a blunt point, directed forward in plane of vertex; antennæ about two and one-half times as long as width of head, slender.

Thorax long and large, but not much arched, ascending a little to mesonotum and rather straight; pronotum nearly as long as vertex, with an epiphysis on anterior edge dorsad; hind tibiæ with a large spur at base and a larger, conspicuous one at apex, as well as 3 large spines and several smaller ones as a fringe around apex; wings more than three times as long as broad, hyaline, acute at apex, extending fully one half their length beyond abdomen in both sexes; first marginal cell larger than second.

Abdomen rather long. Male: Genital segment small; forceps as long as anal valve, relatively thick, not acutely pointed; anal

[6] *This Journal, Sec. D* (1913), **8**, 295.

valve short, rather broad, hairy. Female genital segment long, as long as rest of abdomen, dorsal valve tapering to a slender apex, both acute.

Described from one male and one female from Butuan, Mindanao, P. I. (*Baker*).

Genus **NEOTRIOZELLA** Crawford

This small genus is characterized by the very peculiar genal cones, which are not in the least divergent. They extend either down almost vertically from the head or more nearly horizontally. The body is typically slender, and the legs are small and delicate. The venation is triozine, lacking the cubital petiole.

Neotriozella bicolor sp. nov. Plate I, fig. *h*.

Length of body, 1.8 millimeters; length of forewing, 3.1; width, 0.9; width of head, 0.35. General color reddish to chocolate brown on dorsal half and yellow on ventral half, including venter of both head and thorax and abdomen, legs, antennæ except tip, and lower portion of wings (when folded).

Head not as broad as thorax; eyes large; vertex a little longer than breadth between eyes, slightly convex; genal cones longer than vertex, extending in same plane, slender, tapering slightly to a blunt point, yellowish beneath; antennæ scarcely twice as long as cones, slender.

Thorax a little arched, dorsal surface reticulated; pronotum scarcely visible between vertex and mesonotum; legs short, small, apparently weak; wings long, slender, acute, subhyaline, with a dark band extending from basal attachment to apex; cells elongate; abdomen long, rather slender; female genital segment short, about half as long as rest of abdomen; valves about equal in length, thick at base, subacutely pointed.

Described from one female from Los Baños, Luzon, P. I. (*Baker*).

Genus **TRIOZA** Foerster

For a description and discussion of this old and large genus see Crawford.[7] In the collections before me there are 6 Philippine species. Some of these, however, are not sufficiently represented to be included in these descriptions.

Trioza eugeniæ sp. nov. Plate I, fig. *e*.

Length of body, 2 millimeters; length of forewing, 5.2; width, 1.7; width of head, 0.7. General color greenish yellow; abdomen bright green, wings shining (field notes by Rutherford).

[7] *Bull. U. S. Nat. Mus.* (1914), No. 85, 74.

Head distinctly narrower than thorax, rather large; vertex concave on each side of median suture; genal cones scarcely half as long as vertex, broadly rounded, a little divergent, pubescent; antennæ about one and one-half times as long as width of head, slender.

Thorax broad, long; pronotum large; præscutum longer than broad; legs moderately long; hind tibiæ with 4 black spines at apex, 3 together and 1 alone; wings hyaline, very long, acute at apex, more than half of length beyond abdomen; marginal cells long.

Abdomen rather short, especially in male; forceps short, slender; anal valve larger, triangular, with a petiolate attachment at base. Female genital segment very short; dorsal valve longer than ventral; both subacute.

Described from 9 males and females from Peradeniya, Ceylon, collected by A. Rutherford on May 12, 1913, in galls on leaves of *Eugenia malaccensis*. "The galls were so numerous that they formed a continuous gall on the upper surface of the leaf."

This and the next species are closely related both in structure and habits to two American species of the same genus, *Trioza magnoliæ* Ashmead and *T. koebelei* Kirkaldy. An Asiatic genus, *Cecidotrioza* Kieffer, bears a close resemblance to these gall makers and is probably congeneric.

Trioza asiatica sp. nov.

Allied closely to *T. eugeniæ*, but differs markedly as follows: Color shining black or dark brown; middle and hind tibiæ and antennæ whitish, except at tip; body distinctly more slender; head nearly as wide as thorax, because of the slenderer thorax; genal cones smaller, about one third as long as vertex, orange to brown; antennæ twice as long as width of head; thorax more slender. Wings similar, a little shorter (4.2 millimeters), differing slightly in venation as follows: Second marginal cell scarcely twice as long as greatest width; first marginal cell smaller, narrower; cubital vein about twice as long as first furcal. Abdomen more elongate. Male anal valve much larger, more rectangular rather than triangular. Female genital segment large, nearly as long as rest of abdomen, thick at base, converging to acute apex; dorsal valve a little longer than ventral.

Described from two males and two females from Butuan, Mindanao, P. I. (*Baker*), and one male from Mount Maquiling, Luzon, P. I. (*Baker*). Judging from its close resemblance to the foregoing species, it is probable that this is a gall-making species.

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ILLUSTRATION

PLATE I. FOREWINGS OF PSYLLIDÆ.

FIG. *a. Dynopsylla minor* sp. nov. Dotted portions brown.
b. Homotoma pacifica sp. nov. Dotted portions black.
c. Homotoma bakeri sp. nov. Dotted portions black.
d. Megatrioza armata sp. nov.
e. Trioza eugeniæ sp. nov.
f. Pauropsylla bakeri sp. nov.
g. Pauropsylla spondiasæ sp. nov.
h. Neotriozella bicolor sp. nov.
i. Paurocephala orientalis sp. nov.
j. Pauropsylla floccosa sp. nov.
k. Calophya luzonensis sp. nov.

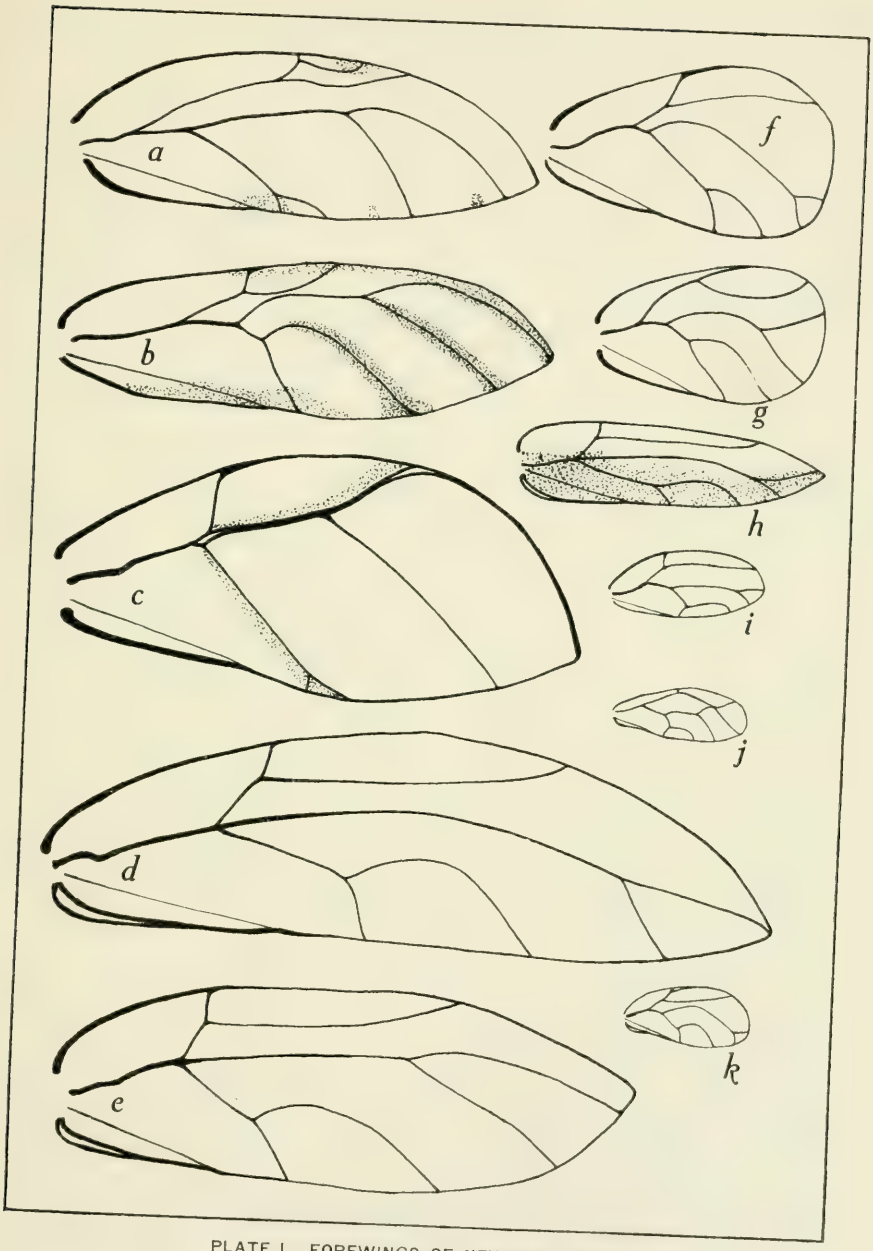

PLATE I. FOREWINGS OF NEW PSYLLIDÆ.

I. BEITRAG ZUR COLEOPTEREN FAUNA DER PHILIPPINEN

Von W. SCHULTZE
(*Manila, P. I.*)

MIT 2 FIGUREN IM TEXT

CETONINÆ

Thaumastopeus mcgregori sp. nov. Textfigur 1, *b*.

Supra et subtus laete viridi-aurea aliquid rufescens, nitidissima. Processu mesosterni longo et conspicuus angulatus.

Long. 31.5 mm., lat. 16.5 mm.

LUZON, Laguna, Paete (*R. C. McGregor*).

Type in meiner Sammlung.

Diese Art sieht oberflächlich kleinen Exemplaren von *Agestrata luzonica* sehr ähnlich, die Farbe ist jedoch mehr metallisch kupfrig glänzend. Im Vergleich mit *Thaumastopeus cupripes* Waterh. (Textfigur 1, *c*) ist diese Art viel gedrungener gebaut. Kopf relativ gross, der Clypealausschnitt halb so lang als der Clypeus. Letzterer kräftig punktiert, seine erhabenen Aussenränder nach den Augenwinkeln zu etwas nach innen gebogen.. Die Punktierung reicht bis über die Augen, nur ein kleiner Teil der Stirn ganz glatt. Fühler dunkelgrün. Thorax in der Mitte und nach den Hinterrändern zu seicht narbig, nächst den Seitenrändern kräftiger punktiert. Die Ausbuchtung am Seitenrand des Thorax nicht gerundet wie bei *T. cupripes*, sondern stumpfwinkelig. Der Thoraxfortsatz im Verhältnis zu letztgenannter Art relativ gedrungen gebaut. Flügeldecken grün kupfrig metallisch glänzend. Parallel der Naht eine deutliche Punktreihe die in die Schwiele und letztere in einen kleinen Dorn ausläuft. Weitere feine Punktreihen auf den Flügeldecken die teilweise unterbrochen sind. Die Buckel sehr scharf markiert. Hinterer Teil des Seitenrandes stark nadelrissig, desgleichen das Pygidium. Die wellenartig und concentrisch nadelrissigen Stellen seidenartig glänzend. Abdominalsegmente etwas dunkler kupfrig rot. Mesosternalfortsatz sehr stark entwickelt, einen kräftigen Dorn bildend. Derselbe ist ähnlich wie bei *T. pugnator* Heller (Textfigur 1, *a*) bildet jedoch zuerst eine gerade Linie

FIG. 1. Mesosternalfortsatz von *a*, *Thaumastopeus pugnator*; *b*, *T. mcgregori*; *c*, *T. cupripes*.

mit der Körperunterseite und ist dann, einen stumpfen Winkel bildend, nach oben gebogen, von der Spitze an ist die obere Kante zuerst geradlinig und erst wo sie in die Basis übergeht, gebogen.

Diese schöne Art widme ich dem eifrigen Sammler und Ornithologen, Herrn R. C. McGregor.

TROGINÆ

Trox montalbanensis sp. nov. Textfigur 2 *a–c*.

Schwarz, matt. Kopf: Clypeus stumpfwinkelig, vorn gerundet, der Rand aufgebogen und mit feinen Borsten besetzt. Fühler dunkelbraun, 1. Glied mit borstenartigen gelben Haaren besetzt. Stirn mit einer wulstartigen Erhöhung, desgleichen eine solche jedoch schwächer nächst dem Seitenrande. Thorax stark gewölbt, nächst den Seitenrändern scharf abgesetzt und flach. Vorder- und Seitenrand eine scharfe Ecke bildend. Längs des mittleren Teiles des Thorax und am Vorderrande, sowie nächst den Seitenrändern—hier jedoch flächenartig erweitert—Schwielen oder schwielenartige Erhöhungen bestehend aus einer gelbbraunen wachsartigen Substanz mit feinen Tuberkeln, die letzteren mit feinen Börstchen besetzt. Die Stellen zwischen den Schwielen sind schwarz, jedoch ebenfalls mit zerstreuten Tuberkeln besetzt. In der Mitte, am Hinterrande des Thorax, eine grubenartige Vertiefung. Seiten- und Hinterrand mit feinen Borsten besetzt. Flügeldecken mit je neun leistenartigen, unterbrochenen Schwielen, dieselben nach den Seitenrändern zu tuberkelförmig, mit feinen Börstchen besetzt, gelbbraun. Zwischen den Schwielen je eine Reihe tiefer Nadellöcher. Vor letzteren steht ein feiner gelbbrauner Punkt. Die Seitenränder der Flügeldecken leicht aufgebogen und mit feinen Börstchen besetzt. Vordertarsen sehr kurz, ein Drittel der Länge der Hintertarsen. Vordertibia am Vorderrand mit gelbbraunen Borsten, Aussenrand mit einem Zahn. Mittel- und Hintertibien mit wachsartiger Substanz bedeckt und fein beborstet.

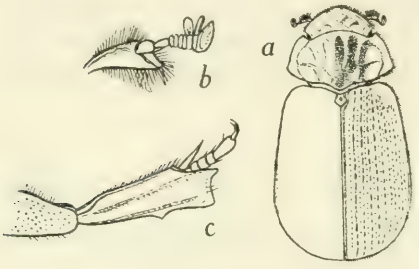

FIG. 2. *a*, *Trox montalbanensis* sp. nov.; *b*, linke Antenna von unten; *c*, linkes Vorderbein von unten.

Länge, 12 mm.

LUZON, Rizal, Montalban Schlucht (*A. de los Reyes*).

Type in meiner Sammlung.

Diese Art wurde von meinem Sammler, im August dieses

Jahres, in der sogenannten oberen Höhle in der Schlucht von Montalban, in Anzahl, an dem Guano von Fledermäusen, die dort zu vielen Tausenden hausen, gefunden.

RHIPIDOCERINÆ

Nur eine Art des Genus *Callirhipis* war bis jezt von den Philippinen bekannt, die Originalbeschreibung dieser Art folgt hiermit:

Callirhipis antiqua Waterh.[1]

Elongata, postice attenuata, obscure fusca, dense flavo-griseo-pubescens; thorace antice parum angustato et rotundato, creberrime evidenter punctato, impressionibus quatuor parum distinctis; elytris sat crebre fortiter punctatis, interstitiis crebre subtilissime punctatis.

Long. 7½ lin; lat. 2⅝ lin.

Antenae two-thirds the length of the elytra, fuscous. Thorax gradually (but not much) narrowed anteriorly from the base, regularly rounded in front, not constricted in the middle, distinctly and very thickly punctured; the dorsal impressions are not deep, the two on the disk and the pair next the scutellum moderately distinct, the impression within the posterior angles scarcely perceptible. The punctuation of the elytra is very strong, but the punctures are not so large as in *C. occultus*, and they do not form lines, the interspaces are very finely and thickly punctured.

Hab.—Philippine Islands. Brit. Mus.

This species is close to *C. Bowringii*,[2] but is less narrowed posteriorly, the thorax is not so short, and is a little narrowed from the posterior angles forward. The punctuation of the elytra is less strong and not in lines.

Waterhouse beschreibt nur den ♂ von *C. antiqua*. In meiner Sammlung befinden sich sechs Exemplare, 4 ♂ und 2 ♀, die ich vorläufig auf diese Art beziehe. Bemerken möchte ich jedoch, dass bei allen Exemplaren die Leisten auf den Flügeldecken kräftig ausgeprägt sind. Die Behaarung der Männchen ist verhältnismässig lang reihenförmig und die Haare stehen zu einander V-förmig.

Länge ♂, 13.5–15 mm.; ♀, 17–21 mm.

LUZON, Benguet, Baguio (*R. C. McGregor*).

Callirhipis bituberculata sp. nov.

♂: Ockerfarbig, Kopf kräftig und dicht punktiert und behaart. Zwischen der Fühlerbasis wulstartig aufgetrieben, hinter derselben eine schwarze Tuberkel. Fühler schwarz, kräftig und dicht punktiert und behaart, die Enden des dritten bis elften Gliedes mit gelblichen Haaren besetzt. Thorax dicht punktiert und behaart, vorn stark desgleichen der discale Teil gewölbt, seitlich und nach dem Hinterrande zu abgeflacht, und mit

[1] *Trans. Ent. Soc.* Lond. (1877), 384.
[2] Waterhouse, ibid. (1877), 383.

einer kräftigen grubenartigen Vertiefung. Hinterrand des Thorax sowie Vorderrand des Schildchens und der Flügeldecken schwarz gesäumt. Letztere sehr kräftig reihenförmig punktiert und sehr dicht behaart, sodass die Leisten zwischen den Punktreihen undeutlich wahrnehmbar sind. Eine mässige Impression in der Mitte nächst dem Vorderrande jeder Flügeldecke. Meso- und Metathorax sowie Abdominalsegmente schwarz, punktiert und sehr fein behaart, nur die basale Hälfte der Klauen rotbraun.

Länge, 10.5 mm.

LUZON, Rizal, Montalban (*A. de los Reyes*).

Type in meiner Sammlung.

Callirhipis helleri sp. nov.

♂ : Kopf, Thorax und Flügeldecken schwarzbraun, hellgrau behaart. Kopf kräftig punktiert, die höckerartige Erhöhung zwischen der Basis der Fühler stark und tief gekerbt, nach der Stirn grubenartig verlaufend. Fühler, 1. Glied schwarz, fein punktiert und spärlich behaart, die folgenden rotbraun, 3. bis 11. Glied fächerartig, sehr fein behaart. Fühlerlänge 17 mm. Thorax dicht punktiert, vorn stark gewölbt. Zwei kleine grubenartige Vertiefungen im discalen Teil, etwas seitlich, dieselben unbehaart; zwei weitere längliche und seichte Eindrücke in der Mitte nächst dem Hinterrande; mehr seitlich davon je ein mehr flächenartiger Eindruck. Flügeldecken stark gewölbt, kräftig und unregelmässig punktiert, ein kräftiger Eindruck auf jeder Flügeldecke in der Mitte am Vorderrande die Fortsetzung des Eindruckes des Thorax bildend. Zwei leistenartige Längsschwielen in der Mitte jeder Flügeldecke und eine längs der Naht; die mittlere nur 2/3 der Länge der Flügeldecke erreichend; die äussere nahe der Spitze verlaufend. Schildchen nahezu rund und sehr stark behaart. Körperunterseite dicht und fein punktiert und sehr fein behaart, Beine rotbraun, Schenkel schwarz, dicht hellgrau behaart, besonders die Tibien und Tarsen. Klauen, die äussere Hälfte schwarz.

Länge, 19 mm.; Schulterbreite, 5.9 mm.

LUZON, Laguna, Paete (*R. C. McGregor*).

Type in meiner Sammlung.

Diese Art widme ich dem eifrigen Coleopterologen Herrn Hofrat Prof. Dr. Heller, Dresden.

Diese Art ist der *C. dissimilis* Waterh.[3] der Beschreibung nach ähnlich, jedoch ist die Skulptur von *C. helleri* eine andere.

[3] Waterhouse, ibid. (1877), 380.

Callirhipis montalbanensis sp. nov.

♀ : Kopf kräftig, dicht perlich punktiert und schwach behaart. Vorderrand des Clypeus, Seiten des Kopfes und ein schmaler Querstreifen auf dem Scheitel schwarz. Unterseite, Stirn und Scheitel ockerfarbig. Ein leichter stufenartiger Querabsatz auf der Stirn und ein seichter Längseindruck in der Mitte des Scheitels. Fühler schwarz, 1. und 2. Glied kräftig und dicht punktiert und beborstet, 3. bis 11. Glied fein behaart und an den Enden mit einigen Börstchen besetzt. Thorax, Ober- und Unterseite ockerfarbig, dicht punktiert und fein behaart. Längs der Mitte eine seichte Rinne, seitlich, nächst dem Hinterrande, je eine kräftige grubenartige Vertiefung. Hinterrand des Thorax sowie Vorderrand des Schildchens und der Flügeldecken schwarz gesäumt. Letztere nahezu parallel für 4/5 der Länge, dann sanft gerundet bis zur Spitze; ockerfarbig; sehr kräftig, dicht und reihenförmig punktiert. Ein keilförmiger schwarzer Längsfleck auf jeder Flügeldecke, von der Mitte nach hinten gerichtet, sowie vier nicht stark ausgeprägte leistenartige Längsschwielen. Körperunterseite und Beine schwarz, erstere sehr dicht und fein punktiert und fein behaart, letztere stärker behaart.

Länge, 17 mm.; Schulterbreite, 4.8 mm.

LUZON, Rizal, Montalban (*A. de los Reyes*).

Type in meiner Sammlung.

Callirhipis nigriventralis sp. nov.

♂ : Rötlich ockerfarbig, Kopf kräftig und dicht punktiert und sehr fein behaart. Die Wulst zwischen der Fühlerbasis mässig entwickelt. Seiten des Kopfes sowie Fühler schwarz. Erstes Glied kräftig punktiert, letztgenanntes und 2. Glied mässig behaart, die folgenden fächerförmigen sehr dicht behaart. Thorax sehr dicht und kräftig punktiert und weitläufig gelblich behaart. Schwach gewölbt, nächst den Hinterecken mit einem seichten Eindruck, desgleichen ein solcher nächst dem Hinterrande in der Mitte. Hinterrand des Thorax sowie Vorderrand des Schildchens und der Flügeldecken schwarz gesäumt. Flügeldecken mit einem kräftigen Eindruck in der Mitte nächst dem Vorderrande; kräftig und dicht reihenförmig punktiert und weitläufig gelblich behaart. Die Skulptur der Flügeldecken ähnlich wie bei *C. philippinensis* m. Abdominalsegmente schwarz, sehr fein punktiert and behaart. Beine dicht punktiert und kräftig behaart, schwarz, Schenkel und basaler Teil der Klauen rotbraun.

Länge, 9.5 mm.

LUZON, Laguna, Paete. Zwei Exemplare (*R. C. McGregor*). Type in meiner Sammlung.

Callirhipis philippinensis sp. nov.

♂ : Kopf rötlich ockerfarbig, sehr dicht körnig punktiert und fein behaart. Fühler schwarz und behaart. Erstes Glied kräftig, die folgenden sehr dicht punktiert. Thorax ockerfarbig, sehr dicht körnig punktiert und fein behaart. Seitlich in der Mitte eine kräftige Impression. In der Mitte nächst dem Hinterrande ein seichter Eindruck nebst zwei Grübchen. Vorder- und Hinterrand des Thorax sowie Vorderrand des Schildchens und der Flügeldecken schwarz gesäumt. Flügeldecken sehr gross und dicht reihenförmig punktiert und fein behaart. Erstes Drittel ockerfarbig, sodann W-förmig abgesetzt und die hinteren zwei Drittel schwarz. Ein kräftiger Eindruck in der Mitte am Vorderrande. Abdominalsegmente schwarz dicht punktiert und fein behaart. Metathorax rotbraun, seitlich und vorn schwarz, ebenfalls punktiert und fein behaart. Beine sehr dicht punktiert und behaart, schwarz, die Schenkel, mit Ausnahme eines kleinen Teiles nächst den Kniegelenken, sowie die Coxae, ockerfarbig.

♀ : Die gekämmten Fühler stärker behaart, speziell die Spitzen des dritten bis elften Gliedes. Thorax ohne seitliche Impression; in der Mitte nächst dem Hinterrande zwei feine Grübchen. Flügeldecken, die schwarze Zeichnung erreicht nahezu das Schildchen und ist vorn an der Naht verbreitert, nicht W-förmig wie beim ♂ ; auch ist die Skulptur kräftiger, die Leisten zwischen den Punktreihen stärker ausgeprägt. Der äussere Teil des Ovipositors rötlich ockerfarbig, die Spitzen dunkler.

Länge ♂, 8 mm.; ♀, 9, 5 mm.

LUZON, Laguna, Paete. Drei Exemplare, 2 ♂ und 1 ♀ (*R. C. McGregor.*

Typen in meiner Sammlung.

Callirhipis tiaongona sp. nov.

♂ : Hell rotbraun, Kopf kräftig und dicht, Stirn und Scheitel weitläufig punktiert, die wulstartige Erhebung zwischen der Fühlerbasis sehr stark entwickelt und in der Mitte seicht gekerbt. Fühler rotbraun, 1. Glied sehr fein und dicht punktiert und sehr fein behaart, 2. Glied mit wenigen feinen Börstchen besetzt; die folgenden fächerförmigen sammtartig. Thorax dicht punktiert, vorn sehr fein, nach dem Hinterrande zu kräftiger und dichter gelblich behaart. Mässig gewölbt, nach den Hinterecken zu abfallend. In der Mitte etwas seitlich zwei

kräftige, nächst dem Hinterrand, oberhalb des Schildchens, zwei kleine seichte Grübchen, Flügeldecken kräftig reihenförmig punktiert, ein mässig tiefer Eindruck in der Mitte jeder Flügeldecke am Vorderrande. Letzterer sowie das Schildchen schwarz gesäumt. Die Flügeldecken nächst der Naht dicht, nach den Rändern zu feiner und schwächer gelblich behaart. Besonders je seitlich des Schildchens eine kurze deutliche Haarschwiele. Unterseite und Beine sehr dicht und fein punktiert und behaart. Klauen schwarz.

Länge, 9.5 mm.

LUZON, Tayabas, Tiaong (*A. Worm*).

Type in meiner Sammlung.

Diese Art ähnelt der Beschreibung nach der *C. lineata* Waterh.[4]

[4] Ibid. (1877), 387.

ERKLÄRUNG DER TEXT FIGUREN

FIG. 1. *a, Thaumastopeus pugnator; b, T. mcgregori; c, T. cupripes.*

2. *a, Trox montalbanensis* sp. nov.; *b,* linke Antenna von unten; *c,* linkes Vorderbein von unten.

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NOTES ON JAPANESE LEPIDOPTERA AND THEIR LARVÆ: PART II [1]

By A. E. WILEMAN
(*Manila, P. I.*)

THREE COLORED PLATES

RHOPALOCERA

NYMPHALIDÆ

NYMPHALINÆ

APATURIDI

Genus **APATURA** Fabricius

Apatura FABRICIUS, Illiger's Magazin (1807), 6, 280; Seitz's Macrolep. of the World, Faun. Pal. (1909), 1, 160.

Apatura ilia Schiffermiller.

Larva and pupa of *Apatura substituta* Butler. Plate I, fig. 1, larva; fig. 2, head; fig. 3, cephalic horn, inside aspect; fig. 4, view of dorsal tubercle, lateral aspect; fig. 5, tail, dorsal aspect; fig. 6, food plant; figs. 7 and 8, pupa.

Japanese name, *ko-murasaki.*

Papilio (*Apatura*) *ilia* SCHIFF., Wien. Verz. (1776), 172; HÜBNER, Eur. Schmett. (1794), 1, figs. 115, 116; (1824–1826), figs. 809, 810; LEECH, Butterf. China, Japan, Corea (1892–1893), 1, 161; MIYAJIMA, Jap. Butterf. [Nihon Chōrui Dzusetsu (Jap.)] (1904), 134, Pl. XIV, fig. 6, ♂ (nec Hübn. = *substituta* Btlr.); MATSUMURA, Cat. Insect. Jap. (1905), 1, 7, No. 50; STICHEL, Seitz's Macrolep. of the World, Faun. Pal. (1909), 1, 161, Pl. 50c. ♂ ♀; Berge's Schmett.-Buch. Hoffmann (1899), 14, Pl. 8, figs. 5 *a*, larva; 5 *b*, imago, ♂; NAGANO, Nawa's Insect World [Konchū Sekai (Jap.)] (1909), 13, 375.

[1] The first paper of this series was printed in *This Journal, Sec. D* (1914), 9, 247–268, 3 pls.

Apatura substituta BUTLER, Cist. Entom. (1873), 1, 158; PRYER, Rhop. Nihon. (July, 1888), 22, Pl. 5, fig. 9, ♂; STICHEL, Seitz's Macrolep. of the World, Faun. Pal. (1909), 1, 163, Pl. 50d, ♂.

Papilio (*Apatura*) *clytie* SCHIFF., Wien Verz. (1776), 321; STICHEL, Seitz's Macrolep. of the World, Faun. Pal. (1909), 1, 162, Pl. 50c, ♂ ♀; MATSUMURA, Thousand Insects of Japan (Nihon Senchū Dzukai (Jap.)] (1907), 4, 79, Pl. 68, fig. 4, ♂ (nec Schiff = ? *substituta* Btlr.).

Apatura ilia var. *serarum* OBERTH., Étud. d'Ent. (1891), 15, 11, Pl. 1, fig. 8, ♂; STICHEL, Seitz's Macrolep. of the World, Faun. Pal. (1909), 1, 163, Pl. 50d, ♂.

Apatura ilia ab. *mikuni* WILEMAN, Entomologist (1910), 43, 93, ♂.

Apatura here FELDER, Wien. Ent. Mon. (1862), 6, 27; STICHEL, Seitz's Macrolep. of the World, Faun. Pal. (1909), 1, 162, Pl. 50e, ♂ ♀.

Apatura here ab. *sobrina* STICHEL, Seitz's Macrolep. of the World, Faun. Pal. (1909), 1, Pl. 50e, ♀.

Apatura bunea HERRICH-SCHÄFFER, Schmett. Eur. (1844), 1, figs. 161, 164; STICHEL, Seitz's Macrolep. of the World, Faun. Pal. (1909), 1, 163, Pl. 55d, ♂.

The larva of *A. substituta* figured (Plate I, fig. 1) was taken May 23, 1901, at Kobe, Settsu Province, Honshu, on willow, Japanese name, *yanagi* (*Salix* sp.). A female imago emerged June 11, 1901, which I identified at the British Museum (Natural History) as *A. substituta* Butler. Another male imago, which emerged at Hakodate, Hokkaido (Yezo), August 5, 1902, and a female, locality and date unrecorded, are both referable to *A. substituta*. The larvæ from which these two specimens emerged were compared, previous to pupation, with the drawing of the larva from which the female imago emerged June 11, 1901, and were found to be identical.

Apatura substituta is placed by Leech and Stichel as a form or variety of *A. ilia* Schiff., and I am content, for the present, to leave it as a synonym of that species. At the same time I am inclined to think that, for reasons which follow, it is a distinct species, and not a subspecies nor a variety. Stichel[2] remarks of *A. substituta* as follows:

> In Japan, the species (*A. ilia* Schiff.) is represented by *substituta* Btlr. (Plate 50d) which is very similar to *metis* Frr. (and therefore often confounded with it). The ground-colour of this form is generally darker, the eye-like spots of both wings are not obsolescent, the submarginal spots of the hindwing elongate-ovate or rounded-quadrate, instead of arrowhead-shaped or luniform as in *metis*, and on the underside the band of the hindwing is more distinctly white, contrasting with the ground. Some specimens (from Korea) have the bands or the upperside whitish and therefore recall *bunea*.

[2] Seitz's Macrolep. of the World, Faun. Pal. (1909), 1, 163.

I may remark that these Korean specimens referred to by Stichel, which recall *A. bunea,* may be referable to the aberration *A. mikuni* Wileman, which I described from Mikuni, Bungo Province, Kyushu,[3] as "possibly a dimorphic form of *A. ilia* var. *substituta;*" but as the type is not at hand, I am unable to say positively and cannot compare it with Seitz's figures of *bunea* or *substituta.*

Stichel catalogues many forms of *A. ilia,* but the names appearing in the synonymic caption seem to be the only ones connected in any way with China and Japan.

Of *Apatura ilia* Schiff. (Seitz, 1, Plate 50c) (= *Papilio iris* Esp.) Leech remarks that "typical specimens of *ilia* are either exceedingly local, or of very rare occurrence in eastern Asia," and Seitz does not record it from Asia. Matsumura in his Catalogus Insectorum Japonicum (sic) mentions that it is found in Honshu. No doubt his *ilia* Hübn. equals *substituta* Btlr., as he does not mention *substituta* in his catalogue. *Apatura ilia* seems to be confined to Europe.

Apatura clytie Schiff. (= *iris* Esp., *julia* Schrk., *astasia* Hbn.) (Seitz, 1, Plate 50c), according to Stichel, also is confined to Europe. Matsumura [4] records it as a variety of *A. ilia* from the four islands of Hokkaido (Yezo), Honshu, Shikoku, and Kyushu and from Korea and China; this also seems to be an error for *A. substituta,* as his figure, apparently, represents either *substituta* Butl., or *mikuni* Wileman, not *clytie* Schiff.

Apatura substituta Butl. (Seitz, 1, Plate 50d) is the common form (?) of *ilia* in Japan, and is recorded by Stichel from the Japanese islands of Honshu and Hokkaido (Yezo) and from northern China, Korea, and Amurland. Pryer records it from Honshu as *ilia,* from July to September. I have taken it in Honshu from June to September, in Kyushu in June and July, and in Hokkaido (Yezo) in July and August. The larva appears in June, and there seems to be only one brood of the butterfly in the year. It is to be noted here that Miyajima [5] figures *A. ilia* Hübn., male, and Matsumura [6] figures *A. ilia* var. *clytie* Schiff., male, as being the form of *Apatura ilia* occurring in Japan. Both the figures given by these authors neither agree in the

[3] *Entomologist* (1910), 43, 93.

[4] Thousand Insects of Japan (Nihon Senchū Dzukai) (1907), 4, 79, Pl. 68, fig. 4, ♂.

[5] Japanese Butterflies (1904), 134, Pl. 14, fig. 6, ♂.

[6] Thousand Insects of Japan (1907), 4, 79, Pl. 68, fig. 4, ♂.

former case with the figure given by Stichel [7] for *ilia*, male, nor in the latter case with the figure given by him for *clytie*, male, [8] but they both agree well with the figure given by Stichel for *substituta*, male.[9] Matsumura in referring to his figure remarks in a note that "this variety has the markings very distinct but the ground-color is ashy-white; it occurs in Kyushu but is rare." His figure, I believe, represents *mikuni* Wileman, male,[10] also taken in Kyushu, in which the tawny-orange spots and bands of both wings are replaced by white ones. Apparently these spots and bands in his figure are white, not tawny-orange; and, if so, the figure represents *mikuni*, a dimorphic form of *substituta*.

Apatura here Feld. (Seitz, 1, Plate 50e) ab. *sobrina* Stichel (Seitz, 1, Plate 50e) is from eastern, central, and northern China and seems to have been erroneously recorded from Japan by Felder.

Apatura serarum Oberth. (Seitz, 1, Plate 50d) (male = *phaedra* Leech) from western and central China and Yunnan.

Apatura ilia ab. *mikuni* Wileman (male, type unfigured) from Honshu, Japan = ? dimorphic form of *A. substituta* Butl. The tawny-orange spots and bands of *substituta* are replaced by white.

The reason why I think *Apatura substituta* Butl. is entitled to rank as a species is because the larva apparently differs from that of *ilia* Schiff., which is described by Stichel [11] as follows:

> Larva of the species (*A. ilia* Schiff.) adult 4–5 cm, dirty green, similar to that of *iris* Linn. (nec Esp.) in shape and markings, but the reddish horns on the head with black stripe, the anterior part of the body with two red-edged yellow lines, the body from the center backwards on each side with 5 red-margined yellow oblique stripes which extend over two segments, anal processes and legs blue-green. Its habits similar to those of *A. iris* Linn.; feeding especially on *Populus tremula, P. pyramidalis*, and on various willows, like *Salix caprea, viminalis*, and *rosmarinifolia*. Pupa greenish, carinate dorsally, the back, the wing cases and the processes of the head edged with yellow.

A comparison of Stichel's description of the larva of *A. ilia* with my original figure of the larva of *substituta* shows the following differences: "Anterior part of the body with two red-edged yellow lines;" *substituta* shows one yellow longitudinal line only, not red-edged, extending from the head to the end of

[7] Macrolep. of the World, Faun. Pal. (1909), 1, 161, Pl. 50c, ♂ ♀.
[8] Opus cit., 162, Pl. 50c, ♂ ♀.
[9] Opus cit., 163, Pl. 50d, ♂.
[10] *Entomologist* (1910), 43, 93, unfigured, ♂.
[11] Opus cit., 162.

the sixth segment (counting from and including the head). *Apatura substituta* has the same number of yellow oblique stripes, namely five, which are not red-margined. No mention is made by Stichel of the dorsal tubercle or spine on segment 8; this is an important point, and if this spine does not exist in the larva of *ilia*, it at once separates the two species. A figure of this dorsal spine is given in Plate I, fig. 4; apparently it is composed of four small tubercles. As the larva is represented in fig. 4 in a lateral position, I am unable to say positively whether this spine is single or paired on the dorsum. The artist did not draw a figure showing an upper dorsal aspect of the larva, and I made no note at the time as to whether the spine on the dorsum was single or paired. It is probably paired. However, this point is of minor importance, as *ilia* apparently possesses no dorsal spine.

A reference to the figure of this larva given in Berge's Schmetterling-Buch shows no dorsal spine nor does mention of it appear in his description. Lang [12] remarks of the larva of *ilia* that it is—

very similar to that of *iris* Linn., but somewhat smaller and of a yellowish colour, except on the ventral surface. The cephalic horns are bordered with yellow. Feeds on *Salix* and several kinds of *Populus*, chiefly *Populus alba*.

Lang also does not mention the presence of a spine on the dorsum, and as these two authors could hardly have overlooked such an important character, I believe that *substituta* is a species distinct from *ilia*.

Pupa.—The pupa of *Apatura substituta* is figured on Plate I, figs. 7, 8. Pryer states that "the green pupa mimics a young willow leaf, both in shape and colour." It has faint white oblique stripes on the dorsum, and with the exception of this agrees with Stichel's description of the pupa of *ilia*.

Genus **VANESSA** Fabricius

Vanessa Fabricius, Illiger's Magazin (1807), 6, 281; Stichel, Seitz's Macrolep. of the World, Faun. Pal. (1909), 1, 200.

Vanessa canace Linnæus.

Plate I, fig. 17, larva; fig. 18, food plant.

Japanese name, *murasaki-tateba* or *ruri-tateba*.

Papilio canace Linn., Syst. Nat. (1767), 12, 779.

Vanessa canace Leech, Butterf. of China, Japan, Corea (1892–1893), 1, 255; Stgr. and Rebel, Cat. Lep. Pal. (1901), 1, 26, No. 163; Kershaw, Butterf. Hongkong (1907), 41, Pl. V, fig. 2, ♀; Pl. 6a, fig. 5, larva; fig. 6, pupa; Miyajima, Jap. Butterf. [Nihon Chōrui

[12] Butterfl. Eur. (1884), 157, Pl. 35, fig. 1.

Dzusetsu (Jap.)] (1904), 113, Pl. X, fig. 8; MATSUMURA, Cat. Insect. Jap. (1905), 1, 9, No. 68; MATSUMURA, Thousand Insects of Japan [Nihon Senchū Dzukai (Jap.)] (1907), 4, 91, Pl. 70, fig. 12, ♀; STICHEL, Seitz's Macrolep. of the World, Faun. Pal. (1909), 1, 205, Pl. 63c; FRUHST., Seitz's Macrolep. of the World, Faun. Indo-austral. (1912), 9, 527.

Papilio charonia DRURY, Ill. Exot. Entom. (1710), 1, Pl. XV, figs. 1, 2.

Vanessa charonia PRYER, Rhop. Nihon (1889), 27, Pl. VII, fig. 4.

Vanessa glauconia MOTSCHULSKY, Étud. Entom. (1857), 6, 28 (= *no-japonica* Siebold).

Stichel and Fruhstorfer [13] give the following races and subspecies of *Vanessa canace* which are connected with China, Japan, and Formosa, and I have given a précis of their remarks. Fruhstorfer says:

V. canace, widely distributed from North to South, inclines to geographical differentiation. Two general types can be recognized: The first, peculiar to the Japanese and Philippine Islands, displays before the apex of the forewing a white spot, whereas in the second type, which belongs to the Indian-Malayan region, this spot is blue.

Of the first group Fruhstorfer records the three following insular races:

RACES AND SUBSPECIES OF VANESSA CANACE

WHITE-SPOTTED RACES

Vanessa no-japonica Siebold (= *glauconia* Motsch.); subspecies insular race (1, 206, Pls. 63c and d, ♂ ♀, figured as *charonia* Drury; 9, 427); Siebold's older name of *no-japonica* has to be retained instead of *glauconia* Motsch. for this subspecies. From Japan (Honshu), also in the southern Japanese islands as far as Oshima and Okinawa in the Loochoo Islands (Ryukyu), Korea. The female in two forms (? seasonal).

Vanessa siphnos Fruhst.; subspecies, insular race (? seasonal form), 1, 206; 9, 527, Pl. 117, fig., ♂). From Ishigakishima, most southern of Loochoo Islands (Ryukyu).

Vanessa benguetana Semper (9, 527); subspecies, very near to *no-japonica* Seib.; from northwestern Luzon, Philippines, at 3,800 feet [about 1,200 meters].

I have taken this form in Luzon at from 1,700 to 2,000 meters (5,000 to 6,000 feet), in November and December, from Baguio up to the Cervantes trail leading to Bontoc. It was of frequent occurrence on the Cervantes trail at about 2,000 meters elevation below Pauai (Haight's), but not many specimens were observable at about 2,100 meters, which is the elevation of Haight's place. The female of this species is a remarkably large and handsome form. I have also found the larva feeding on a species of *Smilax* and observed the female ovipositing on the same plant, which grows commonly in the mountains of Benguet. Semper records it during July and August.

[13] Seitz's Macrolep. of the World, 1, 205, and 9, 527.

With *Vanessa drilon* Fruhst. the series of the blue-banded subspecies begins. In contrast to *no-japonica* the white spotting on the apical area of the forewing is reduced. The female hardly differs from the male.

BLUE-BANDED SUBSPECIES.

Vanessa drilon Fruhst. (9, 527). From Formosa, 1,500 to 2,000 meters (4,000 to 6,000 feet), at Chip-chip and on the borders of Dragon and Le-hiku Lakes.

Vanessa charonides Stichel (1, 206, Pl. 63, ♂, and underside, figured as *canace* Linn. (9, 328). From eastern Siberia (Amurland and Ussuri), western China, and Korea.

Vanessa charonia Drury (1, 206; 9, 528). From eastern and southern China, Hongkong, ? Tonkin, Assam, Hainan; larva on *Smilax*, gregarious in December.

All the forms found in continental India are comprised under the general name of *canace*, but it is not necessary to refer to them here.

The larva figured (Plate I, fig. 17) was taken October 15, 1900, at Yoshino, Yamato Province, Honshu, on a spiny creeper which my Japanese collector named *sankirai* (*Heterosmilax japonica* Kth.). Pryer and Miyajima, however, give the name of the food plant as *saru-tori-ibara* (*Smilax china* Linn.), and this is probably the correct name of the creeper figured (Plate I, fig. 18). The larva also appears to feed on *Smilax china* in Hongkong according to Kershaw, and I have found it on a species of *Smilax* in the mountains of Benguet subprovince, Luzon. I have also found the larva on a species of lily growing in a garden at Atami, Honshu, feeding in a semigregarious state. A male imago emerged from the pupa resulting from my larva, which is probably referable to the form *glauconia* = *no-japonica*, but the date of emergence was not recorded.

Another larva was taken at Tokyo May 2, 1894. The larva appears to be very liable to attack by ichneumon flies, as I have taken it on many occasions, but have only once succeeded in rearing it, all the other larvæ having been infested with ichneumons and dying before coming to maturity. My figure of the larva is not very good, as it was just preparing to pupate. The one given by Kershaw in Butterflies of Hongkong and south-eastern China is an excellent figure, and his description of the full-grown larva, which is given below as well as descriptions of the ova and pupa, agrees with my figure.

Ova sub-conical, multi-angled longitudinally, the angles whitish, the rest green. Laid singly on the upper side of leaves of *Smilax china* Linn., a very prickly climber with scarlet berries, native to China, Cochin China and Japan. Fam. *Liliaceæ*.

Larva, very young; head black, general colour shiny yellow brown, base of spines light yellow. Later, general colour grayish maculated with dark brown, the yellow of the base of the spines suffused and almost forming a

broad yellow ring on each segment. Branches of spines nearly black. Full grown, each segment narrowly banded transversely with black and pale yellow, these latter bands narrower than the black. Each segment also broadly banded transversely with orange, spotted with black, the spines being set in these bands. Seven longitudinal rows of stout, pale yellow spines, or processes, spined laterally at the top with black and up the stems with pale yellow spinelets, the tips black. Head black bristly with black hairs, with the suture narrowly marked in orange. The first spine of the central dorsal row is on the fifth segment, the last spine on the twelfth or penultimate segment. The two last segments irregularly marked with black and orange, with a large sub-circular black spot above the anus. Prolegs black, ringed at the base with orange. Underside chiefly black, but banded narrowly with whitish, something like the upper surface. After the late molts, when nearing pupation, the stems of the spines become white, and the pale yellow transverse bands on the body also are nearly white.

Pupa angular, two rows of sharp processes down the back of the abdomen, and other very small processes on the dorsal surface. Head deeply cleft, the two parts sharply pointed and curved inwards. General colour deep purple-brown, variously marked with reddish; a silver marking on each side of the back of the thorax, each marking divided into two by a transverse brown line. After some days the four lowest processes (just above the silver spots) become dark red-gold. Attached by the tip only, without a band.

Although the eggs seem to be always laid on *S. china*, and the larvæ are there found, yet they will generally eat several other species of *Smilax*.

The following descriptions of the larva and pupa are taken from various authors:[14]

Vanessa canace Linn. "Larva. Segments alternately orange and white, with numerous black spots on the orange segments and black streaks on the white; seven white, branching, black-tipped spines on each orange segment." (*Hampson.*)[15]

"Pupa. Variegated reddish brown, with frontal gold and silver spots; head produced and bifid." (*Hampson.*)

Vanessa canace, race *haronica* Moore. "Larva. Light red; spotted with black, the segments divided by blackish and purple lines; anal segment slightly humped; segments armed with eight longitudinal rows of yellow branched spines: head and legs black. Feeds on *Smilax*." (*Moore.*)[16]

Pupa.—"Reddish brown; abdominal segment with two dorsal rows of small reddish pointed tubercules; thorax angular; head-piece produced and bifid." (*Moore.*)

Imago.—"Usually a very wary, easily scared insect, it is occasionally seized with unaccountable fits of boldness, and I have more than once seen it settle again and again on a moving jinrikisha in a crowded street. It is on the wing throughout the year, though most numerous in autumn.

[14] See Fauna of Br. India, Butterflies (1905), 1, 372.

[15] *Journ. Asiat. Soc. Beng.* (1888), pt. 2, 355.

[16] Lepidoptera of India (1899–1900), 4, 94, Pl. 315, figs. 2, 2a, 2b, larva and pupa, ♂ ♀.

The sexes are similar, but the white sub-apical marking on the upper side of the forewing is larger in the female, than in the male." (*Kershaw.*)

"Common all over Japan and Korea. It is a variable species in the contour of the wings, width of the blue submarginal bands, and the size and colour of the costal spots, which may be either blue (*canace*), or white (*glauconia*), the blue submarginal band of the forewing, which usually ceases at its junction with the larger costal spot, is in some specimens carried up as far as the apical spot, noticeably so in specimens taken in the mountain districts of central Japan in October. * * * So far as I know the var. *glauconia* appears to be confined to Japan and the Loochoo Islands. * * *." (*Leech.*)

The adult is very partial to the gummy exudations of wild cherry and other trees and to the sap issuing from *Cossus* burrows in oak trees. As Kershaw observes, it is occasionally very bold. Individuals of this species have settled on my butterfly net while I held it and on my white helmet. It is fond of sitting on wet places on the roads and of flying about late in the afternoon just before dusk, when it is more than usually audacious.

Matsumura records *Vanessa glauconia* Motsch. (= *no-japonica* Sieb.) from the Japanese islands of Hokkaido (Yezo), Honshu, Shikoku, and Kyushu, and I have taken it in Honshu and Kyushu in various localities on the mountains and plains from May to October. It undoubtedly hibernates in the imago state, as I have taken specimens flying in the months of March and April at Tokyo. I have observed it in Japan as high as from 1,300 to 1,700 meters (4,000 to 5,000 feet). There are probably two if not three broods in the year according to its geographical range. In Hokkaido there is probably only one brood, as the summer is very short.

Genus **DIAGORA** Snellen

Diagora japonica Felder.

Plate III, figs. 10 and 11, young larva, lateral and dorsal aspects; figs. 7 and 9, adult larva; fig. 8, cephalic horn, enlarged; fig. 1, head, enlarged; figs. 2, 3, 4, and 5, horn on segments 3, 6, 8, and 11, respectively, enlarged; fig. 6, anal horns, enlarged; figs. 12 and 13, pupa.

Japanese name, *gomadara-chō.*

Apatura japonica Felder, Wien. Ent. Mon. (1862), 6, 27.

Euripus japonica Pryer, Rhop. Nihon. (July, 1888), 23, Pl. 5, fig. 8.

Hestina japonica Leech, Butterf. China, Japan, Corea (1892–1893), 1, 146, Pl. 20, figs. 5 and 6, vars.; Miyajima, Jap. Butterf. [Nihon Chōrui Dzusetsu (Jap.)] (1904), 136, Pl. 14, fig. 7, ♂; Matsumura, Cat. Insect. Jap. (1905), 1, 7, No. 48; Matsumura, Thousand Insects of Japan [Senchū Dzukai (Jap.)] (1907), 4, 80, Pl. 68, fig. 5, ♀.

Diagora japonica Stichel, Seitz's Macrolep. of the World, Faun. Pal. (1909), 1, 167, Pl. 56b, ♂; 56c, ♀.

Hestina australis LEECH, Butterf. China, Japan, Corea (1892–1893), 1, Pl. 20, fig. 5, ♂.

Diagora australis STICHEL, Seitz's Macrolep. of the World, Faun. Pal. (1909), 1, Pl. 56c; NAWA, Insect World [Konchū Sekai (Jap.)] (1902), 6, 134, Pl. 4, larva, pupa, imago, ♂♀.

Diadema diagoras HEW., Exot. Butt. (1863), 3, Pl. 1, fig. 1 (= *japonica* Feld.).

Hestina subviridis LEECH, Entom. (1891), 24, suppl. 27.

Diagora subviridis STICHEL, Seitz's Macrolep. of the World, Faun. Pal. (1909), 1, Pl. 60b, sex?

Hestina yankowskyi GROSE-SMITH and KIRBY, Rhop. Exot. (1891), pt. 16, 2, Pl. 1, figs. 3 and 4, ♂.

Diagora yankowskyi STICHEL, Seitz's Macrolep. of the World, Faun. Pal. (1909), 1, 167.

Hestina subviridis var. *intermedia* LEECH, Butterf. China, Japan, Corea (1892–1893), 1, 145.

Diagora subviridis var. *intermedia* STICHEL, Seitz's Macrolep. of the World, Faun. Pal. (1909), 1, 167.

Hestina japonica var. *chinensis* LEECH, Butterf. China, Japan, Corea (1892–1893), 1, Pl. 20, fig. 6, ♂.

Diagora japonica var. *chinensis* STICHEL, Seitz's Macrolep. of the World, Faun. Pal. (1909), 1, Pl. 56c.

Stichel remarks that *Diagora subviridis* Leech is presumably a subspecies of *persimilis* Westwood, the nymotypical form of which inhabits the Himalayas; *D. subviridis* differs from *persimilis* only in the whitish green streaks and spots being enlarged, the underside being of a greenish tint. *Diagora subviridis,* with its aberrations or forms of *yankowskyi, intermedia,* and *chinensis,* is the Chinese race or subspecies, while *japonica* Feld., with its aberration *australis,* is the Japanese race or subspecies. Stichel places all of these under *subviridis. Diagora japonica* Felder, however, should have precedence as the type, since it was described in 1862 and *subviridis* in 1891.

Plate III, figs. 10 and 11, represent the young larva of *Diagora japonica* Felder, taken at Kobe, Settsu Province, Honshu, in October, 1900, on a tree named in Japanese *enoki* (*Celtis sinensis* Pers.). This larva, which is given in lateral and dorsal aspects, I failed to breed.

Plate III, figs. 7 and 9, represent an adult larva of *D. japonica* taken in June, 1901, at Yoshino, Yamato Province, Honshu, also on enoki.

Fig. 7 represents this larva on June 8, 1901, and fig. 9 represents it on June 29, 1901. About the latter date it was preparing to pupate, but unfortunately died before it effected the pupal metamorphosis. Therefore I was unable to obtain the imago. However, I have bred *D. japonica* from similar larvæ on previous

occasions and have no doubt as to the identity of the larva figured. My larva, moreover, agrees well with the figures and description given by Nawa.[17]

Nawa states that "the young larvæ [of *Diagora japonica*] hatched from the third brood of the imago, appearing at Gifu, Honshu, from the middle of September to the beginning of October, are at first ashen-grey in colour and during hibernation rest on dead enoki leaves their color assimilating well with the dry, dead leaves so that they are not easily discovered."

I have found them myself as late as February concealed in crevices of the bark. Nawa further states that "when full grown the larva is green with two bifurcated horns on the head; two large horns on segment 7 (not including head as first segment), smaller horns on segment 2, 5, 10 and two on the anal segment." This agrees with the number of horns on my larva.

The pupa is described by Nawa as light green. It is represented with oblique white streaks in his figure, but Nawa does not mention these streaks in his description. I bred an imago of *D. japonica* from a light green pupa with oblique white streaks on May 18, 1901, so that they evidently exist as figured by Nawa. Pryer remarks of the larva:

it hibernates on the bark of the twigs of the tree (enoki), and is then grey, but as soon as the leaves appear in spring it changes its skin and becomes green. It is of the usual *Apatura*, tapering, cylindrical shape, with strongly bifurcated head.

The following description is taken from my original figure. In the description I have taken the head as the first segment, so that the horns are placed upon segments 3, 6, 8, and 11, respectively, instead of, as in Nawa's description, on segments 2, 5, 7, and 10. Nawa counts the segment succeeding the head as segment 1, while I count the head as segment 1.

Larva.—Length, 56 millimeters when full grown. Apaturid shape; green; two cephalic horns; five faint yellowish, oblique, lateral stripes; whitish, longitudinal, subspiracular (or suprapedal) stripe from head to tail; short white longitudinal line from head to first pair of spines on segment 3; anal segment strongly bifurcated into two parallel horns. Nawa does not mention the oblique stripes in his description.

It appears from Nawa that Pryer gives the time of appearance of the imago as June, August, and October. Miyajima gives it as June and September. Both Pryer and Miyajima are agreed that there are only two broods of the insect in the year. Nawa

[17] Insect World (Konchū Sekai) (1902), 6, 143, Pl. 4, larva, pupa, imago, ♂♀.

states that there are three annual broods in Gifu, Honshu, namely:

Brood 1. From May to the middle of June.
Brood 2. From end of July to the middle of August.
Brood 3. From the middle of September to the commencement of October.

But few specimens of the imago are seen flying from the middle of August to the middle of September, and very few emerge during this period. The imagoes of the third brood die after ovipositing, and their young larvæ hybernate.

Matsumura records this species from the four islands of Hokkaido (Yezo), Honshu, Shikoku, and Kyushu and from Formosa and Korea, and Seitz records it from China and Japan.

It would be interesting if some entomologist were able to breed *Diagora persimilis* Westwood,[18] in order to discover if the larva is the same as that of *japonica* Leech, since Stichel states that *subviridis* Leech, a form of *japonica* Leech, is presumably a subspecies of *persimilis*. Matsumura gives *nire* (*Ulmus parvifolia* Jacq.) as a food plant of *japonica*.

LYCÆNIDÆ

Genus **ZEPHYRUS** Delman

Zephyrus DELMAN, Kong. Vet.-Akad. Hand. (1816), **37**, 62, 90; SEITZ, Macrolep. of the World, Faun. Pal. (1910), **1**, 269.

Zephyrus orientalis Murray.

Plate I, figs. 12 and 13, larva, lateral and dorsal aspects; fig. 14, food plant; figs. 15 and 16, pupa, lateral and dorsal aspects.

Japanese name, *ō-midori-shijimi*.

Dipsas orientalis MURRAY, Ent. Month. Mag. (1875), **11**, 169.

Thecla orientalis JANSON, Cis. Ent. (1877), **2**, 156; PRYER, Rhop. Nihon. (July, 1888), 14, Pl. IV, figs. 8a and 8b.

Zephyrus orientalis LEECH, Butterf. China, Japan, Corea (1892–1894), **2**, 376; STGR. and REBEL., Cat. Lep. Pal. (1901), **1**, 71, No. 480; MIYAJIMA, Jap. Butterf. [Nihon Chōrui Dzusetsu (Jap.)] (1904), 180, Pl. XX, fig. 3, ♂; 4, ♀; MATSUMURA, Cat. Insect. Jap. (1905), **1**, 18, No. 140; MATSUMURA, Thousand Insects of Japan [Nihon Senchū Dzukai (Jap.)] (1907), **4**, 214, Pl. 75, fig. 3, ♂; SEITZ, Macrolep. of the World, Faun. Pal. (1910), **1**, 269, Pl. 73h, ♂♀ and underside.

Zephyrus diamantina OBERTH., Étud. d'Ent. (1880), **5**, 18, Pl. i, fig. 1.

Zephyrus cognata STGR., Rom. Mém. Lép. (1892), **6**, 152, note.

Zephyrus suffusa LEECH, Butterf. China, Japan, Corea (1892–1894), **2**, 377, Pl. XXVII, fig. 14, ♂; SEITZ, Macrolep. of the World, Faun. Pal. (1910), **1**, 269, Pl. 73h.

[18] Since writing the above I have discovered a reference to the pupa of *Diagora persimilis* Westw. See Mackinnon, *Journ. Bomb. Nat. Hist. Soc.* (1897), **11**, 369, Pl. 4, fig. 8, pupa.

The larva figured (Plate I, figs. 12 and 13) was taken June 14, 1902, at Hakodate, Oshima Province, Hokkaido (Yezo), on dwarf oak, Japanese name, *ko-nara* (*Quercus glandulifera* Bl.); it pupated June 21, and a male imago emerged, date unrecorded, which I identified at the British Museum (Natural History) as *Zephyrus orientalis* Murray. Another male pupated at Kobe, Settsu Province, Honshu, May 11, 1901, and emerged June 1, 1901.

Larva.—Seitz describes the larva as ashy gray, with darker markings, the segments projecting laterally; lives until June on oak. The following description is taken from my original figure: Length, 20 millimeters. Ashy-gray; mediodorsal longitudinal black line edged by white lines on each side; darker lateral oblique streaks edged with white; segments on dorsum projecting acuminately, slightly hairy; the segments projecting laterally above legs.

Pupa.—The pupa is attached by a silken tail pad and abdominal girdle.

Miyajima states that in Japan the larva feeds on evergreen oak, Japanese name, *aka-gashi* (*Quercus acuta* Thunb.). Matsumura and Seitz record the species from Hokkaido (Yezo) and Honshu and also from Korea, central and northern China, and eastern Siberia (Amurland). Matsumura gives *kashiwa* (*Quercus dentata* Thunb.) and *miyama-hannoki* (*Alnus viridis* var. *sibirica* Rgl.) as food plants of the larva. I have taken it at Hokkaido, Honshu, and Kyushu from June to July. Pryer records it in Japan on the plains from May to July and on the mountains from July to August. Leech states that it occurs plentifully all over Japan and at Gersan, Korea, from the end of June to the beginning of August.

Zephyrus attilia Bremer.

Plate I, fig. 11, larva.

Japanese name, *mizuiro-onaga-shijimi.*

Thecla attilia Bremer, Bull. Acad. Pétr. (1861), 3, 469; Bremer, Lep. Ost.-Sib. (1864), 24, Pl. 2, fig. 3; Murray, Ent. Month. Mag. (1874), 11, 168, ♀; Pryer, Rhop. Nihon. (July, 1888), 15, Pl. 4, fig. 11; Stgr., Rom. Mém. Lép. (1892), 6, 153.

Zephyrus attillia Leech, Butterf. China, Japan, Corea (1892–94), 2, 392; Stgr. and Rebel., Cat. Lep. Pal. (1901), 1, 71, No. 483; Miyajima, Jap. Butterf. [Nihon Chōrui Dzusetsu (Jap.)] (1904), 185, Pl. XX, fig. 12; Matsumura, Cat. Insect. Jap. (1905), 1, 18, No. 142; Matsumura, Thousand Insects of Japan [Nihon Senchū Dzukai (Jap.)] (1907), 4, 122, Pl. 74, fig. 20, ♀; Seitz, Macrolep. of the World, Faun. Pal. (1910), 1, 272, Pl. 74d, ♂ ♀.

Zephyrus attilia subgrisea Wileman, Entomologist (1911), 44, 55 (aberration).

The larva figured (Plate I, fig. 11) was taken May 21, 1901, at Yoshino, Yamato Province, on evergreen oak, Japanese name, aka-gashi (*Quercus acuta* Thunb.). A female imago emerged June 8, 1901. The larva also feeds on the dwarf oaks, Japanese name, *kunugi* (*Quercus serrata* Thunb.) and ko-nara (*Quercus glandulifera* Bl.). Graeser found the larva on *Quercus mongolica* at Chabarowka, Amurland, eastern Siberia.

It is an interesting fact that the larva of this species emits a faint sound which resembles the feeble clucking of a hen. One male and four female imagoes also emerged from larvæ similar to the one figured on June 7, 8, 9, 11, and 12, 1901.

Larva.—Seitz describes the larva as pale green with yellow dorsal dashes. Until the end of May, found on *Quercus mongolica,* and frequently infested with *Tachina.* The following description is taken from my original figure: Length, 20 millimeters. Dark yellowish green with lateral yellow oblique streaks; dorsum on segments 5 to 11 acuminate and spined with a few stiff hairs; a slender whitish longitudinal subdorsal line from head to segment 5.

Matsumura records the species from Hokkaido (Yezo) and Honshu and from China, Korea, eastern Siberia (Ussuri and Amurland), and Manchuria. I have taken it from June to July in Honshu and Kyushu, and Pryer records it from May to July.

Zephyrus attilia ab. *subgrisea* Wileman was described from two specimens taken in Yamato Province, Honshu, and as it has not been previously figured, a figure of the imago is given on Plate III, fig. 14. The original description is also quoted beneath for convenience of reference. It may possibly turn out to be a distinct species, as the markings on the underside differ in some respects from those of typical *Z. attilia.* The latter is very common in the Bukenji Woods, near Kanagawa, Yokohama, Honshu.

ZEPHYRUS ATTILIA ab. SUBGRISEA Wileman.

Blackish with a faint purplish tinge; a black mark at end of cell, and indications of the darker under side markings; traces of a bluish white marginal line on each side of the tail. Fringes white. Under side greyish white; fore wings have a brown elongate spot at end of the cell, edged with white and enclosing a faint white line; a brownish, slightly oblique, postmedial band, outwardly edged by a broad white band; the area beyond the band is suffused with brownish and traversed by a submarginal series of white-ringed blackish spots, those towards costa smaller than those towards inner margin, the latter outwardly edged with orange; marginal line blackish; on the hind wings the brown and the white bands are similar to those on the fore wings, but the submarginal spots are less clearly defined outwardly; the outer margin below vein three is orange

enclosing two black spots, that between veins two and three round. Expanse, 32–36 millim. Collection numbers 2017 and 2018. Two specimens from province Yamato, Honshu, July, 1894.

Zephyrus saepestriata Hewitson.

Plate I, fig. 9, larva; fig. 10, food plant.

Japanese name, *uranami-akashijimi.*

Dipsas saepestriata HEWITSON, Ill. Diurn. Lep. (1865), 67, Pl. 26, figs. 7 and 8; PRYER, Rhop. Nihon. (July, 1888), 13, Pl. IV, fig. 5.

Zephyrus saepestriata LEECH, Butterf. China, Japan, Corea (1892–1894), 2, 384; STGR. and REBEL., Cat. Lep. Pal. (1901), 1, 71, No. 488; SEITZ, Macrolep. of the World, Faun. Pal. (1910), 1, 273, Pl. 74e and f, ♂ and underside; MIYAJIMA, Jap. Butterf. [Nihon Chōrui Dzusetsu (Jap.)] (1904), 183, Pl. XX, fig. 9, ♂; MATSUMURA, Cat. Insect. Jap. (1905), 1, 18, No. 146; MATSUMURA, Thousand Insects of Japan [Nihon Senchū Dzukai (Jap.)] (1907), 4, 126, Pl. 75, fig. 6, ♀.

The larva figured (Plate I, fig. 9) was taken May 20, 1901, at Kobe, Settsu Province, Honshu, on dwarf oak, Japanese name, kunugi (*Quercus serrata* Thumb.); a female imago emerged from the pupa of this larva June 8, 1901.

Larva.—The following description is taken from my original figure: Length, 23 millimeters. Pale green with faint yellow subdorsal oblique streaks on the side; dark spiracles; spines on dorsum highly acuminate on segments 5, 6, 7, and 8; a whitish longitudinal subspiracular line running from head to tail. Miyajima states that the larva of this species feeds on ko-nara, a species of dwarf oak (*Quercus glandulifera* Bl.); Matsumura gives kashiwa (*Quercus dentata* Thunb.).

The imago generally flies among dwarf oaks in the early morning and also again in the evening from 5 o'clock on and is very regular in its time of flight. Japanese professional collectors call it *toki* (time, hour) on account of its punctual habits.

Matsumura records it from Hokkaido (Yezo) and Honshu and from eastern Siberia (Ussuri). I have taken it in Hokkaido and Honshu from May to August. It does not appear to have been recorded yet from Shikoku and Kyushu. It is abundant in the Bukenji Woods, near Kanagawa, Yokohama, where dwarf oak is plentiful.

Genus **ARHOPALA** Boisduval

Arhopala BOISDUVAL, Voy. Ast., Lép. (1832), 75; SEITZ, Macrolep. of the World, Faun. Pal. (1910), 1, 274.

Arhopala japonica Murray.

Plate II, figs. 14 and 15, larva, dorsal and lateral aspects; fig. 16, food plant; fig. 17, pupa.

Japanese name, *murasaki-shijimi.*

Amblypodia japonica MURRAY, Ent. Month. Mag. (1875), 11, 170; PRYER, Rhop. Nihon. (1886), 11, Pl. II, fig. 14; LEECH, Butterf. China, Japan, Corea (1892–1894), 2, 344, Pl. 30, fig. 14, ♂.

Arhopala japonica MIYAJIMA, Jap. Butterf. [Nihon Chōrui Dzusetsu (Jap.)] (1904), 173, Pl. XIX, fig. 6; MATSUMURA, Cat. Insect. Jap. (1905), 1, 17, No. 128; MATSUMURA, Thousand Insects of Japan [Nihon Senchū Dzukai (Jap.)] (1907), 4, 114, Pl. 74, fig. 7, ♀; SEITZ, Macrolep. of the World, Faun. Pal. (1910), 1, 274, Pl. 75b, ♂♀ and underside.

The larva figured (Plate II, figs. 14 and 15) was taken September 26, 1900, at Yoshino, Yamato Province, Honshu, on evergreen oak, Japanese name, aka-gashi (*Quercus acuta* Thunb.); it pupated September 30, 1900, and a male imago emerged October 5, 1900. I also found larvæ of this species at Kobe, Settsu Province, Honshu, in May, 1901, from which I bred specimens June 7 and 19, 1901, and July 11, 1901. Therefore there are evidently at least two broods in the year, the larva of the first brood being taken in May or possibly earlier, and the larva of the second brood in September or earlier. Matsumura gives *shii* (*Pasania cuspidata* Cerst.) as the food plant.

Seitz states that *A. japonica* is common in the spring and again from August in central and southern Japan and Korea, and that he caught numerous males in flowering fields as late as November. Miyajima gives the time of appearance as May to September for the first brood and September to April for the second brood. Pryer gives September to December and April. I have taken this species in Honshu and Kyushu from May to October, and Matsumura records it from the same islands and from Shikoku. Therefore it may be said that the species occurs in Honshu, Shikoku, and Kyushu from May to the following April. The late imagoes of the second brood frequently appear on sunny days from November to April, flitting about flowers or the branches of the food plant (evergreen oak). Pryer records the fact that the species hibernates. Miyajima also records it from the Loochoo Islands (Ryukyu). In a note written in a copy of Pryer's Rhopalocera Nihonica which I obtained from the Rev. W. Andrews, of Hakodate in Hokkaido (Yezo), it is stated that *japonica* occurs in Hokkaido, but no date of appearance is given. No author, however, appears to have recorded it from that island, and Matsumura distinctly states that it does not occur there.

Larva.—The larva may be described from my original figure as grayish white tinged with yellow; dark mediodorsal, longitudinal stripe edged broadly with yellow; pale subdorsal and subspiracular longitudinal stripes. Length, 19 millimeters.

In the British Museum (Natural History) *Arhopala japonica* Murray is placed as a synonym of *Panchala asinarus* Felder. The type species of *Panchala* Moore is *P. ganesa* Moore. Seitz, however, does not refer to *asinarus* in his description of, and notes on, *A. japonica,* so I have adopted his nomenclature.

Genus CURETIS Hübner

Curetis HÜBNER, Verz. bek. Schmett. (1827), 102; SEITZ, Macrolep. of the World, Faun. Pal. (1910), 1, 276.

Curetis paracuta Nicéville.

Larva and pupa of *Curetis paracuta* Nicéville. Plate II, fig. 18, larva; fig. 19, food plant; fig. 20, pupa, abdominal aspect; fig. 21, pupa, dorsal aspect; fig. 22, ace mark on pupa, enlarged.

Japanese name, *uragin-shijimi.*

Curetis acuta MOORE, Ann. & Mag. Nat. Hist. (1877), IV, 20, 50; PRYER, Rhop. Nihon. (Nov., 1886), 11; (July, 1888), Pl. IV, fig. 1a, ♂; 1b, ♀ (= *paracuta* Nicéville); LEECH, Butterf. China, Japan, Corea (1893), 349 (= *paracuta* Nicéville); MIYAJIMA, Jap. Butterf. [Nihon Chōrui Dzusetsu (Jap.)] (1904), 176, Pl. XIX, fig. 9, ♂; 10, ♀ (= *paracuta* Nicéville); MATSUMURA, Cat. Insect. Jap. (1905), 1, 17, No. 131 (= *paracuta*); MATSUMURA, Thousand Insects of Japan [Nihon Senchū Dzukai (Jap.)] (1907), 4, 123, Pl. 75, fig. 1, ♂ (= *paracuta*); KERSHAW, Butterf. Hongkong (1907), 77, Pl. VIII, fig. 8, ♂; 9, ♀ (= ? *paracuta*); NAWA, Insect World [Konchū Sekai (Jap.)] (1907), 11, 235, Pl. VII, figs. 1–8 (= *paracuta*); SEITZ, Macrolep. of the World, Faun. Pal. (1910), 1, 276.

Curetis truncata MOORE, Ann. & Mag. Nat. Hist. (1877), IV, 20, 51 (= ♀ of *acuta* Moore).

Curetis paracuta NICÉVILLE, Journ. Bomb. Nat. Hist. Soc. (1901), 14, 248.

Curetis japonica FRUHST., Stett. Ent. Zeitg. (1908), 56; SEITZ, Macrolep. of the World, Faun. Pal. (1910), 1, 276, Pl. 75c, ♂ ♀.

Curetis tsushimana FRUHST., Stett. Ent. Zeitg. (1908), 57; SEITZ, Macrolep. of the World, Faun. Pal. (1910), 1, 276.

Seitz [19] gives the following forms of *Curetis acuta,* but does not mention *paracuta* Nicéville, which is the Japanese form or subspecies of *acuta:*

Curetis acuta Moore (♀ = *truncata* Moore) from China is the "darkest form; the black border is so much enlarged that the discal spots are quite small."

Curetis japonica Fruhst. (Plate 75c, ♂ ♀), from Japan; "the red discal spots are larger than in Chinese specimens." Does this equal *paracuta* Nicéville?

Curetis tsushimana Fruhst. from Tsushima Island, between Korea and Kyushu, "has smaller but brighter red discal spots in the ♂, the ♀ being quite black above except for traces of bluish white scaling on the disc."

[19] Macrolep. of the World, Faun. Pal. (1910), 1, 276.

"A fourth form from Ichang, China, which has above a broad, black border and very light yellowish red discal spots, the hindwing being strongly angulate, is considered by Leech to be a form of *angulata* Moore, while Fruhstorfer treats it together with *angulata* as a form of *bulis* Doubl. and Hew. But as I have found in Japan as well as in China at the same place and hour specimens with sharply angulated outer margin to the hind wing and individuals with the hindwing completely rounded, the distinctions in the shape of the wings appear to me to be of doubtful value."

The following description of *Curetis paracuta* Nicéville is given for convenience of reference:

Male.—Upperside, both wings may be distinguished from all known species of the genus by having the red areas of a duller colour, ferruginous rather than cupreous, as usual, the extent of the red coloration varies greatly, in some specimens being twice as great as in others.

Female.—Upperside, both wings differentiated in the same way by the white areas being heavily frosted with bluish scales, the extent of these bluish-white areas being as variable as in the male, and the apex of the forewing also varies in its greater or lesser acumination. All writers on Japanese butterflies have called the species of the genus *Curetis* occurring there *C. acuta* Moore, which was originally described from Shanghai in North China and of which the *C. truncata* of Moore, and the *C. angulata* of Moore, are in my opinion synonymous. *C. acuta* occurs from the eastern coast of China (Shanghai and Hongkong) to the Western Himalayas. The female has the wings above with white central areas. The late H. Pryer's figure of the female of the Japanese *Curetis* is very bad, as it shows the upperside of both wings white instead of bluish white as it is, I believe, invariably. He describes it as "blue."

C. paracuta appears to be a fairly common species in Japan, Pryer giving four localities for it, Leech, the mountains of Central Japan and I have it from Tokyo and Nikko, besides other places not specified.

Habitat: Japan. Expanse: ♂, 2.0 to 2.1; ♀ 2.0 to 2.2 inches.

The larva of *Curetis paracuta* (Plate II, fig. 18) was taken June 4, 1901, at Yoshino, Yamato Province, Honshu, on wistaria, the Japanese name of which is *fuji* (*Kraunhia floribunda* Willd.). It pupated June 6, 1901, and a male imago emerged June 16, 1901. A second larva was taken at Yoshino July 18, 1901. The imago which emerged is no doubt referable to *C. paracuta* Nicéville, which is the Japanese form of the species.

The transformations of *C. acuta* have been figured and described by Nawa. He gives figures of the larva in all its stages, of the pupa, and of the imago, and a general life history.

Larva.—The following is a description of my larva of *C. paracuta* (Plate II, fig. 18) taken from my original figure: Length, 29 millimeters. Dark green; head retractile; segment 4 considerably dilated laterally and vertically so as to form a decided ridge across the segments; spiracles brown ocellated with white; spiracular and subspiracular region paler in color; two semi-

vertical horns on segment 12, base yellow and black-tipped, from these the larva darts filamentary tentacles, when irritated. These tentacles, which are armed with hairs at the apex, strongly resemble the ciliated antennæ of a bombycid moth and are very well represented in Nawa's [20] figure of the full-grown larva. The markings in his figures, however, do not seem to agree well with those of my specimen. Nawa represents his larva as having a series of subdorsal lateral streaks more or less oblique, a supra-spiracular and spiracular line of white dashes, and a rather quadrate white blotch on the side of segment 9. My larva agrees with his in ground color, and as can be seen from the figure is merely of a paler color in the spiracular region. Nawa mentions that the larva exserts tentacles when irritated and gives the food plant as wistaria (fuji). There are, therefore, apparently two forms of the larva. The pupa is figured on Plate II, figs. 20 and 21, and the following description is taken from my original figure:

Pupa.—Dorsum green, speckled lightly with white and marked with the exact facsimile in miniature of a white ace of spades on the thorax; on the underside, wing cases, and abdomen whitish. Nawa in the figure of his pupa also shows the white ace mark. Seitz [21] describes the larva "of the very closely allied (and perhaps not specifically distinct) *C. malayica* Felder" as follows:

> Larva velvety green with a brown head and a dark red oblique lateral stripe on the 3 and 4 segments, posteriorly with a yellow dorsal stripe and on the 9th segment a white quadrangular spot. The projections of the 12th segment yellowish green, the reversible tentacles reddish yellow with black and white hairs at the apex, the tentacles being moved very fast and at once retracted.
>
> The head of the larva is always kept retracted, being hardly visible when the larva is feeding. On *Pongamia glabra*. Pupa semiglobular, transparent greenish, with a yellowish ovate spot on the anterior portion.

A large white spot, more or less rhomboidal, is represented by Nawa on the side of segment 9 of his larva, but in other respects Seitz's description of *malayica* Felder does not agree with the descriptions by Nawa and myself. Bingham [22] also gives a long description of the larva of *Curetis bulis* var. *malayica* Felder.

Matsumura records *C. acuta* from Honshu, Shikoku, and Kyushu. This, no doubt, is *C. paracuta* Nicéville, the Japanese race. I have taken it in Honshu and Kyushu from June to October, and have taken hibernated specimens in the same islands in May.

[20] Insect World (1907), 11, Pl. 7, fig. 5.
[21] Macrolep. of the World, Faun. Pal. (1910), 1, 276.
[22] Fauna Br. India, Butterflies (1907), 2, 446.

There are probably two broods, and it hibernates in the imago form. It never appears to have been taken so far north as Hokkaido (Yezo), where there are five months of rigorous winter with much snow and ice and a very short summer. Miyajima records *acuta* from Loochoo Islands (Ryukyu), but whether or not this is typical *acuta* or *paracuta*, I am unable to say.

Genus **ARTOPOËTES** Chapman

Artopoëtes CHAPMAN, Proc. Zool. Soc. Lond. (1909), 473. Type, *Lycæna pryeri* Murray.

Artopoëtes pryeri Murray.

Plate II, figs. 23 and 24, larva, dorsal and lateral aspects; fig. 25, food plant; figs. 26 and 27, pupa, dorsal and lateral aspects.

Japanese name, *uragomadara-shijimi.*

Lycæna pryeri MURRAY, Ent. Month. Mag. (1873), 10, 126; PRYER, Rhop. Nihon. (July, 1888), 18, Pl. V, fig. 16; LEECH, Butterf. China, Japan, Corea (1892–94), 2, 313; STGR. and REBEL., Cat. Lep. Pal. (1901), 1, 90, No. 649; MIYAJIMA, Jap. Butterf. [Nihon Chōrui Dzusetsu (Jap.)] (1904), 165, Pl. XVIII, fig. 8, ♀; MATSUMURA, Cat. Insect. Jap. (1905), 1, 20, No. 160; MATSUMURA, Thousand Insects of Japan [Nihon Senchū Dzukai (Jap.)] (1907), 4, 112, Pl. 74, fig. 3, ♂; SEITZ, Macrolep. of the World, Faun. Pal. (1909), 1, 322, Pl. 83e, ♂ ♀ and underside.

Artopoëtes pryeri CHAPMAN, Proc. Zool. Soc. Lond. (1909), 473.

The larva figured (Plate II, figs. 23 and 24) was taken June 16, 1902, at Hakodate, Oshima Province, Hokkaido (Yezo), on a species of ? privet, Japanese name, *ibota* (*Ligustrum japonicum* Thunb.). This larva pupated July 3, 1902, and a female imago emerged July 18, 1902. Dörries found the full-grown larva in Sutschan District, eastern Siberia, in June, feeding on *Syringa amurensis* Rupr. This shrub is also found in Japan and is called *hashidoi* in Japanese.

Pupa.—The pupa is attached by a silken pad at the tail with a girdle round the body.

Larva.—The following description of the larva is taken from my original figure: Length, 17 millimeters. Green; a darker longitudinal mediodorsal line; a brown dorsal patch on segments 2 to 4, narrow on segments 2 and 3, and expanding triangularly on segment 4; abdomen whitish; spiracles dark.

Matsumura records this species from Hokkaido (Yezo) and Honshu. Seitz records it from eastern Siberia (Amurland) and Japan. Miyajima states that it flies from May to July. I have taken it in Honshu and Hokkaido in the same months and in Kyushu (Haki, Bungo Province; Shimoshiiba, Hyūga Province) in July. There appears to be only one brood in the year.

HESPERIIDÆ

ISMENINÆ

Genus **ISMENE** Swainson

Ismene SWAINSON, Zool. Ill. (1820–21), 1, Pl. 16; WATSON, Proc. Zool. Soc. Lond. (1893), 125 (type, *œdipodea* Swainson); MABILLE, Seitz's Macrolep. of the World, Faun. Pal. (1909), 1, 341.

Ismene aquilina Speyer.

Plate II, fig. 1, head, enlarged; fig. 2, dorsal aspect; fig. 3, larva; fig. 4, food plant; figs. 5 and 6, pupa.

Japanese name, *kibane-seseri.*

Ismene aquilina SPEYER, Stett. Ent. Zeitg. (July, 1879), 346; LEECH, Butterf. China, Japan, Corea (1892–1894), 2, 635; STGR., Rom. Mém. Lép. (1902), 6, 214; MIYAJIMA, Jap. Butterf. [Nihon Chōrui Dzusetsu (Jap.)] (1904), 206, Pl. XXII, fig. 10; MATSUMURA, Cat. Insect. Jap. (1905), 1, 24, No. 195; MATSUMURA, Thousand Insects of Japan [Nihon Senchū Dzukai (Jap.)] (1907), 4, 133, Pl. 75, figs. 24, ♂; 20, ♀; STGR. and REBEL., Cat. Lep. Pal. (1901), 1, 94, No. 681; MABILLE, Seitz's Macrolep. of the World, Faun. Pal. (1909), 1, 342, Pl. 86f.

Ismene jankowskii OBERTH., Diagn. Ask. (August, 1879), 4 (published in Naturae Novitates, Sept., 1879); OBERTH., Etud. d'Ent. (1880), 5, 23, Pl. 1, fig. 2, ♀.

Proteides chrysaeglia BUTL., Proc. Zool. Soc. Lond. (1881), 586.

Pythauria chrysaeglia PRYER, Rhop. Nihon. (Dec., 1889), 33, Pl. X, figs. 5a, ♂; b, ♀.

The larva figured (Plate II, fig. 3) was taken July 21, 1902, at Hakodate, Oshima Province, Hokkaido (Yezo) on a tree named in Japanese *sen-no-ki* (*Acanthopanax ricinifolium* S. and Z.). It pupated July 28, 1902, and a female imago emerged August 13, 1902; three other female imagoes emerged on August 10, 13, and 19, 1902, respectively.

Larva.—The following is a description of the larva taken from my original figure: Length, 41 millimeters. Head ocherish; color brownish with paired vertical lateral yellow streaks on each segment parallel with the segmental divisions; two dorsal yellowish white longitudinal lines, one on each side of the dorsum; yellowish white subdorsal and subspiracular stripes, the latter edged with brown below and then with white; abdomen pale.

Pupa.—Purple-gray with a prominent thoracic horn on apex of head and dusted with a purplish bloom. Attached to leaf by a silken pad by tail and a girdle round the middle of abdomen.

Matsumura records this species from Hokkaido (Yezo), Honshu, and eastern Siberia (Ussuri). Leech remarks that it is

"not rare in the mountainous parts of central Japan and also in Yezo." Pryer records it from Asamayama Mountain and Nikko, both in Honshu, and from Yezo (Hokkaido).

I have taken *Ismene aquilina* in the following localities: Honshu, Yamato Province (Dorokawa, August); Hokkaido (Yezo), Oshima Province (Junsai Numa, July, August); Shiribeshi Province (Iwanai, August); Ishikari Province (Sapporo, August; Jozankei, August). I captured it in great numbers at Jozankei, near Sapporo, where it frequented the flowers of a giant thistle which grew from 2 to 3 meters high. I also found it in profusion on the summit of Raiden Tōge (Pass) on the way to Iwanai in Hokkaido (Yezo). Miyajima gives the time of appearance as July and August which coincides with the months mentioned by me above. In Honshu this species appears to be a mountain butterfly, but in Hokkaido it frequents the plains, being also found in great abundance in the mountains.

Genus **AUGIADES** Hübner

Augiades HÜBNER, Verz. Bek. Schmett. (1827), 112; WATSON, Proc. Zool. Soc. Lond. (1893), 103; MABILLE, Seitz's Macrolep. of the World, Faun. Pal. (1909), 1, 347.

Augiades ochracea Bremer.

Plate II, fig. 7, larva; fig. 8, food plant; figs. 9 and 10, pupa, dorsal and lateral aspects; fig. 11, head, enlarged; fig. 12, section, dorsal aspect; fig. 13, tail section, dorsal aspect.

Japanese name, *hime-kimadara-seseri.*

Pamphila ochracea BREMER, Bull. Acad. Pétsbr. (1861), 3, 473; BREMER, Lep. Ost.-Sib. (1864), 33, Pl. I, fig. 11.

Augiades ochracea LEECH, Butterf. China, Japan, Corea (1892–1894), 2, 605; STGR. and REBEL., Cat. Lep. Pal. (1901), 1, 93, No. 673; MIYAJIMA, Jap. Butterf. [Nihon Chōrui Dzusetsu (Jap.)] (1904), 199, Pl. XXII, fig. 1, ♂; MATSUMURA, Cat. Insect Jap. (1905), 1, 22, No. 183; MATSUMURA, Thousand Insects of Japan [Nihon Senchū Dzukai (Jap.)] (1907), 4, 130, Pl. 75, fig. 14, ♂; MABILLE, Seitz's Macrolep. of the World, Faun. Pal. (1909), 1, 348, Pl. 88c, ♂.

Pamphila rikuchina BUTL., Cist. Ent. (1878), 2, 285.

Hesperia rikuchina PRYER, Rhop. Nihon. (Dec., 1889), 34, Pl. X, fig. 16a, ♀; 16b, ♂.

The larva figured (Plate II, fig. 7) was taken July 29, 1902, at Hakodate, Oshima Province, Hokkaido (Yezo), on bamboo-grass, Japanese name, *sasa-gusa* (? *Lophatherum elatum* S. and Z.). A female imago emerged from the resulting pupa on August 17, 1902. The following descriptions of the larva and pupa are taken from my original figures:

Larva.—Length, 24 millimeters. Head blue-green; body

whitish green; dark green mediodorsal longitudinal stripe; laterally whitish; white subspiracular line.

Pupa.—Green; elongated acuminate thoracic horn; five white lines on the dorsum; attached to leaf of food plant by silken pad at tail and a girdle around the abdomen.

Matsumura records the species from Hokkaido (Yezo), Honshu, and Shikoku and from Korea, eastern Siberia (Ussuri and Amurland), and Manchuria. He says that it is rare in the vicinity of Tokyo, but common at Aomori, in northern Honshu. Miyajima adds Kyushu, and gives the time of appearance from July to August. Butler in describing *Pamphila rikuchina* says that the type "occurs at Rikuchin." There is probably no place of that name in Japan, and "Rikuchin" is doubtless a slip for Rikuchiu Province.

ILLUSTRATIONS

[Drawings by Hisashi Kaidō.]

Plate I

Figs. 1 to 8. *Apatura substituta* Butler.
1, larva; *2*, head; *3*, cephalic horn, inside aspect; *4*, view of dorsal tubercle, lateral aspect; *5*, tail, dorsal aspect; *6*, food plant; *7* and *8*, pupa.

9 and 10. *Zephyrus saepestriata* Hewitson.
9, larva; *10*, food plant.

Fig. 11. *Zephyrus attilia* Bremer. Larva.

Figs. 12 to 16. *Zephyrus orientalis* Murray.
12 and *13*, larva, lateral and dorsal aspects; *14*, food plant; *15* and *16*, pupa, lateral and dorsal aspects.

17 and 18. *Vanessa canace* Linnæus.
17, larva; *18*, food plant.

Plate II

Figs. 1 to 6. *Ismene aquilina* Speyer.
1, head, enlarged; *2*, dorsal aspect; *3*, larva; *4*, food plant; *5* and *6*, pupa.

7 to 13. *Augiades ochrace* Bremer.
7, larva; *8*, food plant; *9* and *10*, pupa, dorsal and lateral aspects; *11*, head, enlarged; *12*, section, dorsal aspect; *13*, tail section, dorsal aspect.

14 to 17. *Arhopala japonica* Murray.
14 and *15*, larva, dorsal and lateral aspects; *16*, food plant; *17*, pupa.

18 to 22. *Curetis paracuta* Nicéville.
18, larva; *19*, food plant; *20*, pupa, abdominal aspect; *21*, pupa, dorsal aspect; *22*, ace mark on pupa, enlarged.

23 to 27. *Artopoëtes pryeri* Murray.
23 and *24*, larva, dorsal and lateral aspects; *25*, food plant; *26* and *27*, pupa, dorsal and lateral aspects.

Plate III

Figs. 1 to 13. *Diagora japonica* Felder.
1, head, enlarged; *2*, *3*, *4*, and *5*, horn on segments 3, 6, 8, and 11, respectively, enlarged; *6*, anal horns, enlarged; *7* and *9*, adult larva; *8*, cephalic horn, enlarged; *10* and *11*, young larva, lateral and dorsal aspects; *12* and *13*, pupa.

Fig. 14. *Zephyrus attilia* ab. *subgrisea* Wileman. Imago.

PLATE I. JAPANESE LEPIDOPTERA.

PLATE II. JAPANESE LEPIDOPTERA.

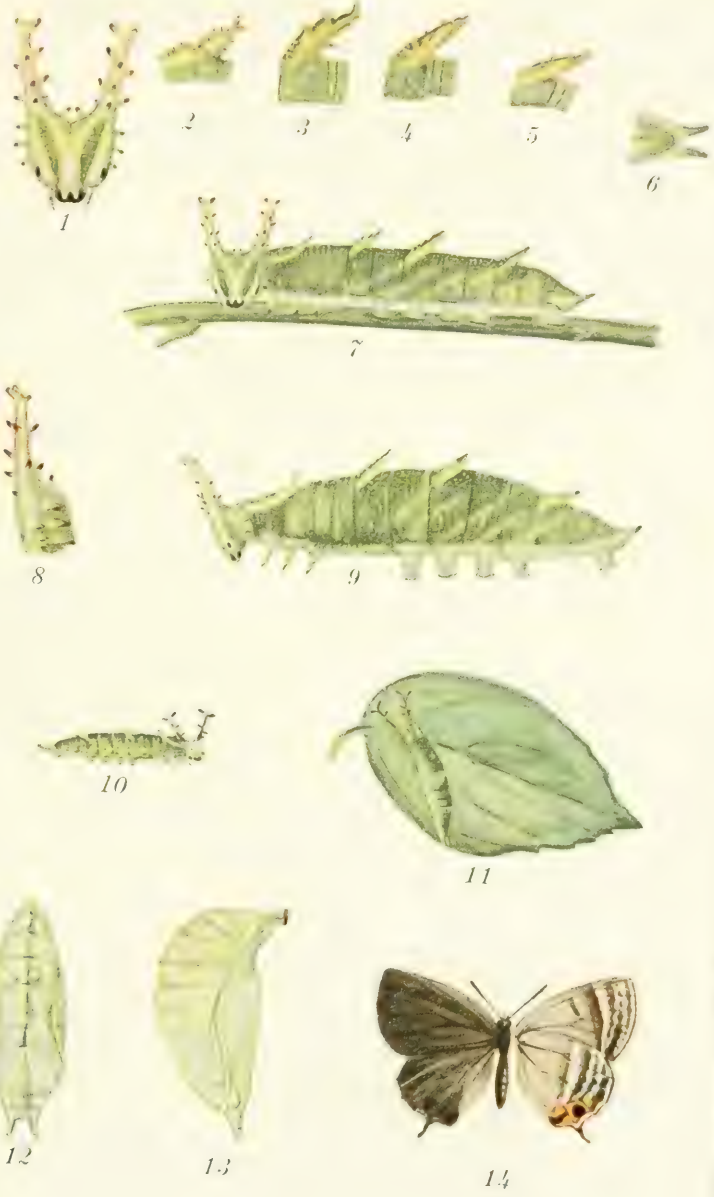

PLATE III. JAPANESE LEPIDOPTERA.

DIFFICULTIES ENCOUNTERED IN THE CULTURE OF THE BAÑGOS, OR MILKFISH, IN ZAMBALES PROVINCE

By Artemas L. Day

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There are a few marine animals that are cultivated to a great extent and to great advantage in the Philippine Islands and that yield much greater returns than would be obtained without cultivation, and there are many others that might be cultivated with great profit. Among the former are the window-pane oyster (*Placuna placenta*), the pearl oyster, and the edible oyster, of which last there are three species in the Philippine Islands, namely, *Ostrea orientalis*, *O. palmipes*, and *O. pyxidata*, and various fishes, such as the catfishes, hito and candule, the carp (*Cyprinus carpio*) recently introduced from Hongkong into the Philippines, and the bañgos. Among those that might be cultivated may be included sponges, mussels, crustaceans, various button shells, and holothurians or commercial trepang.

Among the cultivated fishes the one that receives the most attention in the region around Manila Bay, as also in various other places, is the bañgos, or milkfish, *Chanos chanos* Forskål. It is cultivated also in a few other regions in the Islands, but nowhere else as yet have very great returns been received. There are still large areas both around Manila Bay and in many other suitable regions where the culture has been scarcely started.

The bañgos are grown in tide ponds, where at the falling of the tide the somewhat stale water is removed and at the rising of the tide the supply of fresh water is replenished. These ponds are supplied with latticed gates, that permit the passage of the water without allowing the fish to escape, and also they are supplied with water-tight gates that will retain the water if desired. The ponds are built in mangrove or other swamps along the seashore or streams. In some of these sites little or no excavation is necessary, in others considerable excavation is necessary in order to make a pond of the desired size. Also in the northern portion of Manila Bay land is "made" by planting small mangrove trees in rather shallow water. These trees hold the sand and soil that is washed up among them. Large areas are

being made in this way. By the time the trees are 4.5 meters high all that is necessary to be done is to throw up high dikes or retaining walls, cut out the trees, and adjust the bottom to the required level.

It should be stated here that it has been learned through observation of the live fish, and through examination of the contents of the digestive tract of these fish, that their food consists of various forms of algæ (called *lumut*) and some flowering plants, that will grow in water of about the density of ordinary sea water.

A few months ago my attention was called to the fact that in Zambales Province difficulties were being encountered in the culture of the bañgos, and an invitation was extended to visit the region in difficulty, with the idea of finding a possible solution. To this end a trip was made to Iba, Zambales. Upon stopping at Subic on the way to Iba, a visit was made to the house of the presidente of the town, with a view to learning about the bañgos culture there. The presidente called in one of the large owners of fish ponds, known as Cando, who was questioned concerning his ponds.

The following is the information collected concerning the various ponds, with occasional comments.

INFORMATION CONCERNING VARIOUS PONDS

SUBIC, POND NO. 1

The owner, Mr. Cando, is greatly discouraged over the results he obtains at present. He has ponds with an area of about 19.5 hectares, which he stocks with 30,000 fry at 50 centavos[1] per 1,000. He stocks his ponds in three installments, the remainder of the small fish being kept in a small pond until desired for use. The small fish are placed in the large ponds in May, September, and January, and are removed in August, December, and April. The ponds are emptied of the large fish each time before restocking. All of these fish are of the same age, those for the restocking being kept in a small pond from spawning time until placed in the large pond. Those placed in the large pond in May are very small, but the others are about 10 centimeters long. Forty per cent of the fish placed in the large pond are eaten by fish other than bañgos, and 30 per cent of the small fish die in the "fry" pond before the transfer. The owner thinks that 60 per cent of his total receipts are lost because of the failure

[1] One peso Philippine currency equals 100 centavos, equals 50 cents United States currency.

of the fish to grow large, and this he attributes to the lack of food. He now receives 1,000 pesos annually from his ponds. The small fish, called "seed," that are caught in April are better than those taken in May and June, because they are from larger and stronger adults. Those taken in May and June are poorest.

The owner thinks that a mud bottom is better for the growth of algæ than a sand bottom.

Because of unsatisfactory conditions in his fish culture, Cando secured the services of some bañgos experts from Malabon, Rizal, to help him solve his difficulties, giving them one third of the output while they were with him. Several suggestions were offered by these men, but so far conditions are not satisfactory.

The large blue crab, *Neptunus pelagicus*, grows well in the ponds.

Some disease, probably due to a fungous growth, has appeared in his ponds.

At Iba there are large areas suitable for bañgos ponds, but their number and extent are not at present very great. Several ponds were visited, both those that were completed and stocked with fish, and those that were in the process of construction, and much valuable and interesting information was secured.

IBA, POND NO. 1

Pond No. 1 at Iba belongs to Mr. José Venzon, and it has been used for thirty years. It contains 18.75 ares. It was constructed at great expense, having been dug out of a level area to a depth of about 3 meters. The owner thinks that from 2,000 to 3,000 fish, valued at 20 centavos each, could be taken from the pond each year if they were permitted to feed on the natural growth of algæ only, without introducing any into the pond. However, through a desire to secure greater results, the owner places 10,000 small fish in the pond, of which two thirds are sold at 5 centavos each. The fry cost 50 centavos per thousand. It will be observed that by allowing for the purchase of 3,000 fry and the sale of 2,000 at 20 centavos each, without adding any food to the pond, the owner would receive more money than if he places 10,000 fry in pond, adds food from the river, and sells 6,600 at 5 centavos each.

By placing in the pond a greater number of fish than the natural growth of algæ will support, and so making necessary the transferring of algæ from the river to the pond at extra cost, the owner of the pond is not only securing smaller fish than, according to his own statement, he would receive by placing a smaller number of fry in the pond (and it would not be necessary to

introduce the algæ without the larger number of fish), but he is also receiving smaller money returns for greater labor.

This pond is situated on the bank of a tide river, where there is plenty of algal growth, and the owner transfers about 2 cubic meters of the algæ from the river to the pond each week, at a cost per week of 60 centavos. This is done from May to September only. The owner thinks that because of the increase of the cost of labor of over 300 per cent, since the construction of this pond, it would not be advisable to make other ponds by excavation.

From the condition of the bottom of the pond it is seen that no accumulation of mud from the decay of algæ or other cause is allowed to form. As the soil throughout this whole region is sandy, it will be observed that by preventing the accumulation of any decayed vegetable matter on the bottom of the pond the bottom will continue to be simply bare sand.

IBA, POND NO. 2

Pond No. 2 at Iba belongs to Mr. Pio Acayan. It has an area of about 1.86 hectares. The bottom is largely covered with a thick layer of mud. In a corner of this pond is a smaller one for the fry; it also has a thick layer of mud on the bottom. There is a good growth of algæ in both ponds, and it is especially heavy in the smaller. The bottom of this pond, with its inclosed small pond, has not recently been disturbed at the time of taking out the fish, and the algæ have not been removed.

The conditions in this pond are the most satisfactory of any in Iba. The bottom has a thick layer of mud, and the growth of algæ is very heavy. The conditions here would seem to contradict the idea that sufficient food cannot be obtained for the fish. This is the first pond in Iba where satisfactory food conditions were found to prevail, but because of lack of care in management, poor results were obtained. With proper care this pond should give satisfactory results. Conditions found here contradict the idea of Mr. José Venzon that good and sufficient algæ will not grow in the ponds in Iba. Mr. Acayan said the algæ did not grow well for the first five years after the pond was built, but recently conditions have been much more satisfactory. During the dry season the algæ are scarcer and coarser than in the rainy season and are not eaten so well by the fish. About November the algæ are poorest, and in December, the dry season, algæ begin to grow. These are a little poorer than those of the rainy season. The best algæ, the "salt-water algæ," are to be found in March. The pond is stocked with fish twice a year: namely, in May and

December. By using care—that is, drying the pond and not stocking at once—the owner thinks as good algæ could be obtained in the dry as in the rainy season.

Five thousand fry are needed each time to stock the pond, at 50 centavos per 1,000. Only two fifths of these mature, because of the presence of other fish, such as pompano, bia (*Oxyeleotris* ?), and dalag (*Ophiocephalus striatus* Bloch.) The fish when sold average 23 centimeters in length and sell at 3 for 20 centavos. Because of the small size of the fish, the owner says he gets but 150 pesos per year from their sale. The pond cost 2,000 pesos to build, and the owner is willing to sell for 1,000 pesos.

IBA, POND NO. 3

Mr. Eugenio Frierro is the owner of pond No. 3, which is in process of construction. It will have an area of about 4 hectares, and the cost of construction, including excavation, building of dikes, etc., will be about 500 pesos. The value of the land is 150 pesos.

This pond lies near pond No. 2, belonging to Pio Acayan, and presents about the same conditions. Considerable excavation is necessary, and there are many trees to remove. Soil conditions are about the same as in the other ponds at Iba. There is a mixture of sand and mud, with a decided tendency for the mud to accumulate in the bottom of the pond. Algæ in plenty were found growing, and with proper care given to the regulation of the number of fish in the pond, the same results as in the other ponds in Iba should be obtained.

IBA, POND NO. 4

Pond No. 4 is the second pond of Mr. Pio Acayan. It has an area of about 4 hectares, and will cost approximately 500 pesos to construct. The bottom has a little more mud than that of José Venzon, although the conditions are almost identical.

IBA, POND NO. 5

Mr. Pablo Mercado is the owner of pond No. 5, which is located to the north of the town of Iba. This pond is in process of construction, but promises to be satisfactory and profitable. Conditions are much the same as in Iba pond No. 2, the first of Pio Acayan.

IBA, POND NO. 6

Pond No. 6, owned by Mrs. Tranquilina Fierro, contains 50 ares, but can be made to include 100 ares. Thus far construction

has cost 90 pesos, and 300 pesos will be required to double its size and improve it.

Six thousands fry were put in the pond in May, 1915, costing 50 centavos per 1,000. The fish attain a length of 17.5 centimeters, and sell for 7 centavos. Were two thirds of the fish to reach this size, the returns should be 280 pesos annually. At present most of the money is lost because of inability to secure a reliable caretaker.

On the return to Manila a stop was again made at Subic, where several ponds not previously examined were visited.

SUBIC, POND NO. 2

Pond No. 2 is the property of Mr. Mauricio Pagadan. It has an area of 27.5 ares. Two thousand fry are put in, and satisfactory results are obtained.

SUBIC, POND NO. 3

Mr. Santiago Pagadan owns pond No. 3. It has an area of one-half hectare. One thousand fish are sold annually at 8 centavos each. They are left in the "seed," or small, pond for nine months, and in the large pond for three months. When put in the large pond they are already 12.5 centimeters long. At the end of a year the fish are 30 centimeters long. This is considered a very satisfactory pond.

SUBIC, POND NO. 4

Pond No. 4 is the property of Mr. Fabian Villoria. It is by far the most satisfactory and profitable pond examined. The owner states that he places 20,000 fry in the pond, 18,000 of which mature and are sold at 20 centavos each. The algæ grow very well. He does not scrape the bottom when the fish are removed, but simply drains off the water and fills the pond again as soon as the fish are taken out. The owner thinks that the character of the bottom does not matter greatly, although he thinks a sand bottom is somewhat better than a mud bottom. The fish are taken out in April, and the small ones are put in in October. The delay in restocking is due to the danger of the pond being flooded during the rainy season.

SUBIC, POND NO. 5

Pond No. 5 is owned by Mr. Pedro Villamor. It has an area of a little more than 1 hectare. Two thousand fish are placed in this pond twice a year, and about 1,500 are sold each time, yielding about 300 pesos. The pond cost 400 pesos to construct,

and could be purchased for 800 pesos. The owner says that the blue crab, *Neptunus pelagicus*, and hawks catch some of the small fish.

SUBIC, POND NO. 6

Pond No. 6 is the property of Mr. Pedro Villamor, with an area of 3 hectares. It yields 600 pesos per annum.

SUBIC, POND NO. 7

Mr. Pedro Villamor also owns pond No. 7. It has an area of about one hectare. The two ponds, numbers 6 and 7, are considered by the owner to be more profitable because there is a mud bottom, and the fish eat the small algæ growing on the bottom. The algal growth is found also at the surface. The 1-year-old fish are 60 centimeters long and sell at 50 centavos each. On the day I visited this pond, May 17, 1915, the owner had 10,000 fish, about 5 centimeters long and 21 days old, in a small pond about 9 by 12 meters. These were to be placed in the pond in June. The ponds of Subic numbered 5, 6, and 7 are in no danger of flooding by the river and so are stocked early.

Regarding feeding, the owner of ponds Nos. 5, 6, and 7 says the fish do not eat for about two or three hours while the water is entering the pond, as they are trying to find a way of escape while the water is in great commotion. Otherwise they eat at any time, either night or day.

CONCLUSION

At the beginning of this report it is stated that certain difficulties in the culture of bañgos have been encountered at Subic and at Iba, Zambales, especially at the latter place. The chief of these was thought to be due to the unfavorable conditions present that would not permit the necessary growth of algæ for food. It was thought that because of the sandy nature of the soil the algæ would not grow. It was held to be necessary to have a muddy bottom for a sufficient algal growth. And it was insisted by some fish growers that it is necessary at the time of removing the large fish for market not only to empty the pond of water, but to leave it empty long enough to dry the bottom, and even to scrape the bottom thoroughly. There is, however, a difference of opinion about the character of the bottom. Some engaged in fish culture hold that a clean sandy bottom is necessary, and others contend that a mud bottom is much better. In this connection it is interesting to note that those holding these opposite views get what seem to them to be satisfactory results. But the

fact that in order to clean off the bottom it is necessary to remove the algæ would seem to argue in favor of draining off the water only, at the time of removing the fish, instead of scraping the bottom. This will enable the algæ to grow at all levels—at the top and bottom, as well as at intermediate regions.

It has been suggested that an insufficient growth of algæ is responsible for poor results around Iba, but the fact that there was a very abundant growth of algæ in pond No. 2, of Iba, belonging to Mr. Pio Acayan, helps to solve the difficulty of the other ponds. It was stated correctly that in certain ponds there is not produced sufficient food for the number of fish in the ponds. But the difficulty in these places is that more fish are placed in the ponds than their size justifies. It is necessary in all these ponds to arrive at a correct balance between the number of fish in a pond and the amount of food that can be produced there without exhausting the food supply.

In order to test the influence of the two kinds of bottoms on the growth of the algal food, a sample of the bottom was brought from each of two ponds in Iba. The first is from that of José Venzon, pond No. 1 at Iba, the bottom of which the owner said is too sandy to permit of good growth of algæ. This sample was placed in a small aquarium on May 22, with circulating sea water, and on June 4 some small bañgos were introduced. Also a mixed algal growth from a pond near Manila was placed in the aquarium on May 22, and two months later the algæ were growing very satisfactorily, as also the small bañgos. The same conditions were arranged in another aquarium tank, with the difference that a sample from the bottom of Iba pond No. 2 was placed here. The growth of the algæ in this second aquarium appears to be equal to that of the first, and the fish, which show great growth, feed equally well here. These observations agree with the testimony of different owners of fish ponds in Iba and Subig to the effect that the algal food, lumut, will grow equally well in ponds that at least originally have bottoms of very different proportions of mud and sand.

By not disturbing the bottoms of these ponds, whether or not at first they have a large or small amount of mud, there will accumulate a layer of "soil" from the breaking down of the algæ and a gradual washing in of soil from the sides, which seems to be favorable to the best growth of algæ, or lumut.

The question of the identification of the various algæ will not be taken up here, but will be included in another paper dealing with the food of these fishes exclusively.

The general rules which follow may well be observed in the management of bañgos ponds:

1. After the construction of the pond is completed, disturb the bottom and the algal growth as little as possible.
2. Place in the pond only as many fish as can well be fed on the algæ that grow easily and abundantly.
3. Do not stock the pond, either after building or after removing the fish, until there is a sufficient amount of food to insure a steady and rapid growth of the fish.
4. If there are harmful forms, such as other fishes or certain crabs, that get into bañgos ponds, have the pond empty only long enough to remove the troublesome forms, and then fill up the pond at once.
5. Careful, close, and continuous supervision by the owner or some one else thoroughly competent is very essential for the greatest financial returns.

All of the lands in the Philippines that are available for bañgos ponds or that may be made available may very profitably be used for this purpose. At present it is almost universally true that the demand for fish far exceeds the supply, and through the culture of these fish the general supply may be greatly increased.

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STUDIES IN PHILIPPINE JASSOIDEA, IV: THE IDIOCERINI OF THE PHILIPPINES

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TWENTY-THREE TEXT FIGURES

The Jassoidea of the subfamily Bythoscopinæ are surprisingly well represented in the Philippines, especially in the tribe Idiocerini. They include some economically very important insects. Two of the species are controlling factors in the fruiting of mangoes in many parts of these Islands, and the life histories of these need careful investigation, looking toward methods of control. The benefit that the Filipinos ascribe to the smudging of the trees at the time of flowering comes through the driving out of the swarms of these injurious insects, which frequent the flower clusters.

Taxonomic work in these groups is exceedingly difficult. All of the oriental species in the Idiocerini would have been referred without question to *Idiocerus* twenty years ago. No one would have thought of separating "genera" out of so homogeneous a group. However, Distant has separated three critical genera without fully diagnosing them, and Kirkaldy separated two—one critically separated group, and one very well marked. In continuing the study of oriental material, there are two alternatives—to make all of the genera described by Distant and one described by Kirkaldy subgenera of *Idiocerus*, or to follow their lead to its logical conclusion and separate a number of additional coördinate groups as genera. The latter course is followed in this paper, although the entire subject will have to be reviewed and readjusted in connection with extensive European, African, and American material. This will leave entomologists to their

own inclinations as to whether they dub these groups genera or subgenera.

It is doubtful if any of the species under *Idiocerus* in the Fauna of British India are typical *Idiocerus*, and it is impossible from the meager descriptions there given properly to refer all of them. *Idiocerus niveosparsus* is apparently a *Chunra, I. clypealis* is an *Idioscopus*, and *I. unimaculatus* is apparently a *Pedioscopus*. The remainder of the species there described appear, from the color descriptions, to be different from anything known to me in the Philippines.

The structure and sculpturing of head, the proportions of head, pronotum, and scutellum, the venation of tegmina, the sculpturing of scutellum, and the form of genitalia must be fully described or figured for these species, or their certain identification will be impossible. Some of the species are remarkably similar in coloration, and some are very variably colored. Some of the species show a remarkable sexual dimorphism in colors, particularly on the face, to which I have called attention in the following descriptions.

There are few single characters which could be used for safe generic separation in the Idiocerini, since most of the characters are subject to more or less variation or even lapse in abnormal cases. The average condition must be used, and the general habitus and general census of characters must be constantly considered. The habitus does not always lend itself to clear description, but is readily appreciable in figures or specimens. The following synopses are not comprehensive and are intended only to show the relationships of the forms occurring in the oriental fauna.

BYTHOSCOPINÆ

Synopsis of the tribes.

a^1. Tegmina with an appendix (usually very large); pronotum with a very narrow connection with propleuræ, or a visible connection lacking; head usually wider than pronotum, rarely not as wide or only as wide. **Idiocerini.**

a^2. Tegmina usually without a distinct appendix, or, if with a very small and narrow one, then vertex usually considerably longer at middle than at sides; pronotum usually broadly connected with propleuræ, a carina usually separating the two.

b^1. Head about as wide as, or wider than, pronotum; as seen from above often strongly angulate; face about as long as wide or longer; supra-antennal ledges usually very weak; the scrobes usually shallow ..... **Agalliini.**

b^2. Head usually distinctly narrower than pronotum; as seen from above usually very broadly rounded; face wider than long; supra-antennal ledges very strong; antennal scrobes deep..... **Bythoscopini.**

IDIOCERINI

Diagnostic synopsis of the genera.

a^1. Head very short and much wider than the very short and very broad pronotum; vertex shorter at middle than at eyes, where its anterior margin is strongly sinuate; face with width once and a half the length, front far wider than long; supra-antennal ledge falling far short of reaching eye; clypeus parallel-sided; tegmina very broad; first anteapical cell confluent with median, the second being the only closed anteapical; closed apical cells five, but with supernumerary subobsolete cells in apical portion of costal area..... Ipo Kirk.

a^2. Head, etc., not as above.

b^1. Scutellum, and clypeus at least in part, more or less tumidly elevated; upper lateral sutures of the front usually strong to the ocelli; loræ acute above; scutellum very large, distinctly longer than head and pronotum together.

c^1. Head as wide as pronotum; appendix scarcely reaching apex of corium, and about as wide as second apical cell; vertex shagreened and slightly shorter at middle than at eyes; venation indistinct proximad of apical cross veins; first apical cell twice the width of fourth, which is far shorter than third; pronotum two and a half times as wide as long, its hind margin very slightly incurved; loræ shorter than clypeus and lying in same plane as genæ; supra-antennal ridge strongly sinuate, producing a distinct lobe next front; clypeus broader at base than at apex ..... Iposcopus gen. nov.

c^2. Head usually wider than pronotum; vertex as long at middle as at eyes or longer; venation usually strong proximad of apical cross veins; outer apical cell in tegmina separated from outer subapical by a cross vein, thus three subapical cells; first apical cell about same width as fourth, which is about same length as third; pronotum less than two and a half times as wide as long, its hind margin strongly incurved; loræ longer than clypeus; supra-antennal ledge evenly curved, not producing a lobe next front; clypeus usually distinctly broader at apex than at base.

d^1. Five apical cells in tegmina; first subapical cell about as large as second or as third; appendix scarcely reaching apex of corium and about as wide as second apical cell; head finely shagreened; loræ lying in same plane as genæ; frontoclypeal suture distinct..... Ipocerus gen. nov.

d^2. Four apical cells in tegmina; first subapical cell much smaller than second or than third; appendix surrounding apex of corium and wider than second apical cell; vertex and upper part of face cross striate; loræ tumidly elevated; fronto-clypeal suture obsolete ..... Chunra Dist.

b^2. Scutellum and clypeus not at all tumidly swollen; upper lateral sutures of front usually not equally distinct near ocelli and near scrobe; scutellum of medium size, rarely as long as, usually distinctly shorter than, pronotum and vertex together.

c^1. Outer apical cell in tegmina separated from outer subapical by a cross vein, thus three subapical cells; vertex normally transversely wrinkled, usually very short and very broad; clypeus usually with

sides strongly incurved and suddenly and strongly broadened apically ..... **Idiocerus Lewis.**

c^2. Outer apical cell in tegmina continuous with the outer subapical, the cross vein lacking (always to be examined by transmitted light), thus never more than two closed subapical cells; vertex usually longer at middle than next eyes, and very long for this group, in proportion to width between eyes.

d^1. Upper lateral sutures of front obsolete, the lower lateral sutures continuous with the supra-antennal ridges, the front thus very broadly open above; ocelli nearer to eyes than to median line, or as near..... **Busonia Dist.**

d^2. Upper lateral sutures of front distinct, always distant more than half the distance from supra-antennal ridges to ocelli; ocelli rarely much nearer to eyes than to median line of face.

e^1. Upper lateral sutures of front each directed toward the inner margin of the ocellus of the same side or nearly so; head distinctly wider than pronotum.

f^1. Tegmina with three apical cells and without subapicals. **Balocha Dist.**

f^2. Tegmina with four apical cells.

g^1. Subapical cells absent..... **Pedioscopus Kirk.**

g^2. Subapical cells (one or two) present... **Idioscopus gen. nov.**

e^2. Upper lateral sutures of front strongly incurved, and from near scrobes each directed toward the ocellus of the opposite side, the front thus appearing far broader than long, and with very strong lateral angles; head about as wide as pronotum; second apical cell pedunculate in present species; first apical cell much broader and shorter than fourth; ocelli nearer to median line than to eyes.. **Idiocerinus gen. nov.**

Genus **IPOSCOPUS** novum

Type, *Iposcopus distanti* sp. nov.

Synopsis of the species.

a^1. Cross vein at base of third apical cell antenodal; head slightly wider than pronotum; colors dark and sharply contrasted....**distanti sp. nov.**

a^2. Cross vein at base of third apical cell postnodal; head slightly narrower than pronotum; colors pale, markings ill defined.....**breviceps sp. nov.**

Iposcopus distanti sp. nov.

Length, 4.5 mm.; width of head, 1.8 mm. Head straw-colored with dark mottlings on upper part of face, including two irregular dark spots between ocelli and upper margin; clypeus, loræ, and lower part of cheeks blackish. Pronotum brownish, two small transverse dashes back of eyes blackish, and hind margin yellowish. Scutellum brown, with two black basal lunulæ and a broad, bright yellow transverse band back of middle; the apex brown. Mesopleuræ blackish. Tegmina brown, with a narrow transverse band near base, nearly continuous with that on scu-

tellum, and a short tranverse commissural ivory-white mark on clavus at apex of inner claval vein; a large irregularly triangular clear area at basal third of costa, and another of same size at apical third; appendix smoky. Sternum and legs straw-colored, the fore tibiæ blackish, the middle tibiæ darkened. Abdomen yellow at base, the genitalia blackish.

Head very finely shagreened throughout, very slightly wider than pronotum; the length of vertex into width between eyes, eleven times; vertex as long at middle as at eyes. Face broader than long; ocelli nearer to eyes than to median line; front more than a fourth broader than long;[1] clypeus broader than long, apical margin slightly incurved; loræ very small, scarcely longer than clypeus, and not one half as wide. Width of pronotum two and a half times the length, nearly seven times as long as

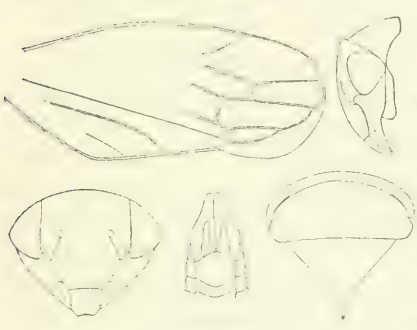

FIG. 1. *Iposcopus distanti* sp. nov.

FIG. 2. *Iposcopus breviceps* sp. nov.

the vertex, the hind margin slightly incurved; surface finely shagreened, with remote and very shallow and irregular subobsolete transverse wrinkles and with scattering and remote darker punctures. Scutellum longer than head and thorax together; the transverse impressed line evenly but not strongly arcuate and with a small fovea anterior to each lateral extremity; median area just posterior to transverse impression, with about five sharply impressed fine transverse lines. Tegmina slightly roughened basally and with punctures along the veins; veins subobsolete basally and remainder slender. Anal segment of male medially produced and strongly longitudinally carinate; pygofers thick, apically subterete, and with a curved longitudinal carina on lower surface.

MINDANAO, Butuan (*coll. Baker*).

[1] Length of front is measured from frontoclypeal suture to a line drawn between ocelli.

Iposcopus breviceps sp. nov.

Length, 5 mm.; width of head, 1.8 mm. Straw-colored with darker mottlings. Face with two small black spots midway between ocelli and upper margin, with large dark mottling on upper portion and with smaller and more sharply defined markings on lateral fields of front; apical half of clypeus, except middle of apical margin, blackish. Pronotum with small, indistinct, darker mottlings, these larger and darker near the lateral angles, and with two small round black spots on anterior margin just within eyes. Scutellum with basal blackish lunulæ, the central foveæ of middle area darkened. Tegmina semitransparent, brownish, a white dot near base of clavus and another at tip of inner claval vein; veins of corium whitish; corium with whitish mottlings near base and with the area of the large, outer apical cell clearer. Mesopleuræ black-spotted. Tibiæ darkened apically. Abdomen nearly concolorous.

Head very finely shagreened throughout, scarcely as wide as pronotum; length of vertex into width between eyes about eleven times; vertex slightly shorter at middle than at eyes. Face broader than long; ocelli equally distant from eyes and median line; front but little broader than long; clypeus about as broad as long, apical margins but slightly incurved; loræ as long as clypeus and about half as broad. Width of pronotum scarcely two and a half times the length, the length more than seven times that of the vertex; surface finely shagreened and remotely subobsoletely wrinkled and punctured. Sculpturation of scutellum as in *distanti*. Tegmina slightly roughened basally and with punctures along the veins; veins very evident basally. Anal segment of female with hind margin laterally strongly incurved; the lateral angles acutely produced, the median portion subtruncate.

MINDANAO, Butuan (*coll. Baker*).

Although this form and *I. distanti* are from the same general region, and one is represented only by males and the other only by females, I do not feel justified in placing them as the two sexes of a single species. Striking sexual dimorphism in colors is to be expected in this group, but I have yet encountered no such sexual differences in structure as are exhibited in this case.

Genus **IPOCERUS** novum

The form here described as the type of a new genus was at first placed in Kirkaldy's genus *Ipo*, following his description. Through the kindness of Mr. Frederick Muir I have been able to examine a specimen of *Ipo conferta* Kirk. from Queensland,

and find that the present form cannot possibly be associated with it. *Ipo* presents a structure of head, clypeus, and loræ very distinct from anything I have yet seen in the Philippine fauna. The tegmina of *Ipo* are quite unique in the Idiocerini, very short and broad, with supernumerary cells outlined in the apical portion of costal area, with the appendix short and broadly extended on to the clavus, and with the claval suture callously thickened toward the apex. The vertex of *Ipo conferta* is very remarkable, the length at eyes being twice that at middle. Neither have I seen any idiocerine insect in the Philippine fauna so large and with a head and pronotum proportionately so broad—the width of the head being 3 millimeters.

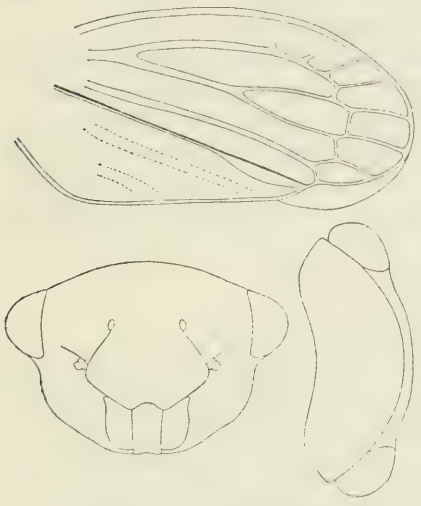

FIG. 3. *Ipo conferta* Kirk.

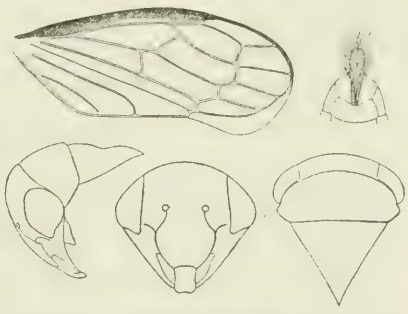

FIG. 4. *Ipocerus kirkaldyi* sp. nov.

In some respects *Ipocerus* strongly resembles *Chunra* as described and figure by Distant, but is very distinct in some characters of first importance.

Type, *Ipocerus kirkaldyi* sp. nov.

Ipocerus kirkaldyi sp. nov.

Length, 4.4 mm.; width of head, 1.8 mm. Straw-colored; head, pronotum, scutellum, and tibiæ very finely reticulately mottled with brownish. Scutellum with darker clouds at lateral angles, at basal middle, at apex, and three at area of transverse impression. The tegmina are semitransparent, tinted with pale golden brown; the veins are dark brown, and except the apical cross veins, with numerous short white interruptions of varying lengths; the costal vein with four large, rectangular white in-

terruptions in addition to several smaller ones. Abdomen with dark incisures above, venter brownish.

Head very finely shagreened throughout, wider than pronotum, the length of vertex into width between eyes four and two-thirds times; vertex as long at middle as at eyes. Face broader than long; ocelli nearer to median line than to eyes; front about as broad as long; clypeus longer than broad, only slightly broadened apically, the apical margin incurved; loræ a third longer than clypeus and about half as wide. Width of pronotum two and a half times the length, the length about three times that of vertex, the hind margin slightly incurved; surface finely shagreened, medially and on posterior half with rather conspicuous but remote dark punctures. Scutellum about a fourth longer than head and pronotum together, the transverse impressed line strongly angulately bent, the surface posterior to this without transverse wrinkles. Tegmina smooth, shining, and rather thin, with a few punctures along the claval veins; veins strong throughout, the costa conspicuously thickened. Anal segment of female with hind margin truncate or slightly incurved; pygofers long, very slender, and strongly haired, far longer than the lateral plates.

PALAWAN, Puerto Princesa (*coll. Baker*).

Genus **CHUNRA** Distant

The genus *Chunra,* as described by Distant,[2] is a taxonomic puzzle. The diagnosis is not at all diagnostic, most of the characters mentioned being tribal characters. The pronotum is stated to be "twice as long as vertex," which would be a marked character if true, but the figure shows it three times.

There occur abundantly in the Philippines, as in other Malayan and Indian countries, species of idiocerine insects, swarms of which attack the flowers of mangoes, as is recorded by Distant for the species *niveosparsus* of Lethierry. Distant's figure of *niveosparsus* shows a strong and continuous suprafrontal carina, which seems to be certainly an error, as does also the form of the clypeus. In the species, as it occurs here, the frontoclypeal suture is quite obsolete. Distant's figure shows the ocelli nearer to eyes than to each other, while he describes the genus *Chunra* as having them about as near. In the forms of *niveosparsus* occurring in the Philippines this varies considerably, as I shall show. Indeed, *niveosparsus,* as figured by Distant, fits his description of the genus *Chunra* about as

[2] Fauna Brit. Ind.—Rhynch. (1907), 4, 185.

well as does his type as figured. There seems to be no doubt that the common mango insects here are forms of *niveosparsus*, and after an extended study of large series of them, I cannot but refer them to *Chunra*, amplifying Distant's description of *Chunra* enough to give it generic standing as compared with *Balocha* and *Busonia*. This, of course, cannot be made final without a careful examination of the structural characters of *puncticosta* Wlk., the type of the genus.

The Philippine forms of *niveosparsus* present wide variations in color of scutellum, as mentioned by Distant for Indian forms, though the general plan of coloration is the same. Three lots of specimens taken at separated points in the Philippines show divergences in coloration and in minor structural characters, and it seems probable that numerous other local forms will be found. Most of the characters used below are variable within narrow limits, averaging as described.

Synopsis of the Philippine varieties of Chunra niveosparsa Leth.

a^1. Length of vertex into width between eyes more than six times; first apical cell of tegmina two fifths the length of second.

b^1. Distance between ocelli much more than half the width of front; transverse impression of scutellum acutely bent. philippinensis var. nov.

b^2. Distance between ocelli one half the width of front; transverse impression of scutellum obtusely bent..... palawanensis var. nov.

a^2. Length of vertex into width between eyes less than six times; first apical cell of tegmina about a fifth the length of second; transverse impression of scutellum acutely bent..... lagunensis var. nov.

Chunra niveosparsa Leth. var. philippinensis var. nov.

The variety *philippinensis* differs from typical *niveosparsus*, as described and figured by Distant, as follows: Median basal spot of scutellum always long, narrow, triangular, sometimes obsolete; apex of clavus shining white-spotted; two small, round, submedian spots in posterior field of scutellum.

The following structural characters may be added: Vertex, and face as far as ocelli, thickly arcuately cross striate. Head wider than pronotum, the length of vertex into width between eyes somewhat more than six times; vertex about as long at middle as at eyes. Face about as broad as long; ocelli nearer to median line than to eyes, the distance between ocelli being about the width of an ocellus more than the distance from eye to ocellus; distance between ocelli more than half the width of front; clypeus several times longer than broad, greatly narrowed centrally, the apical margin incurved; loræ longer than clypeus and twice its breadth at middle. Width of pronotum

about two and one-fourth times its length, its length a little more than four times that of the vertex, the hind margin slightly incurved; surface thickly, evenly shagreened. Scutellum longer than head and thorax together; basal field, except lateral margin, shagreened; apical field, except calloused lateral margins, transversely wrinkled, as are also the submargins of basal field; transverse impressed line strongly, angularly bent, open at apex of angle, the lateral limbs arcuate, the space between them transversely wrinkled. Last ventral segment of female very short, its hind margin subtruncate to slightly sinuate. Hind margin of anal segment of male strongly sinuate, the lateral portions sloping, the median strongly obtuse-angularly produced.

LAGUNA, Los Baños (*coll. Baker*).

Occurring in swarms on mango flowers.

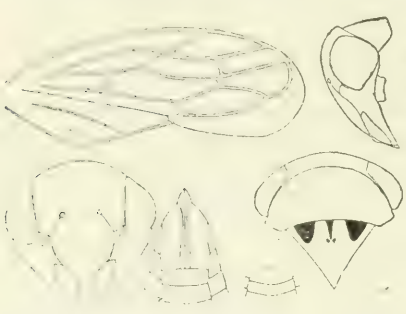

FIG. 5. *Chunra niveosparsa* Leth. var. *lagunensis* var. nov.

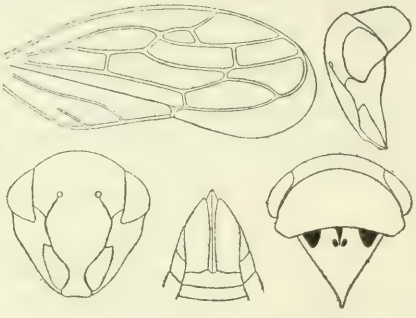

FIG. 6. *Chunra niveosparsa* Leth. var. *palawanensis* var. nov.

Chunra niveosparsa Leth. var. palawanensis var. nov.

This variety differs from var. *philippinensis* as follows: Distance between ocelli one half of width of front; clypeus somewhat shorter and broader; loræ longer than clypeus, but not twice its breadth at middle; scutellum with transverse impressed line very obtuse-angularly bent, the lateral limbs scarcely arcuate. Hind margin of anal segment of female more strongly sinuate, medially strongly notched.

PALAWAN, Puerto Princesa (*coll. Baker*).

Chunra niveosparsa Leth. var. lagunensis var. nov.

This variety differs from var. *philippinensis* as follows: Length of vertex at middle into width between eyes less than six times; distance between ocelli about half the width of front; loræ less than twice the width of clypeus; hind margin of anal segment of female truncate.

LAGUNA, Pagsanjan (*coll. Baker*).

Genus **BUSONIA** Distant

The enlarged first apical cell of the tegmina is not at all diagnostic for this genus, as used by Distant, since it occurs in some other genera—in all degrees in *Pedioscopus*. Well shown in the figure of the type, but not mentioned in the genus characterization, however, is a unique character which well distinguishes this genus—the absence of upper lateral sutures of front, the lower lateral margins being continuous with the supra-antennal ridges. *Idiocerus minor* of Bierman [3] from Semarang, Java, belongs here, as may be seen at once from the figure of the type. Two very inconspicuous species have been encountered in the Philippines, which are, however, remarkably distinct in their structural characters.

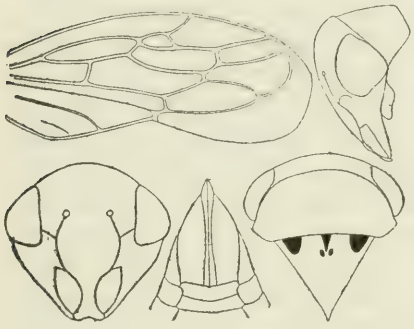

FIG. 7. *Chunra niveosparsa* Leth. var. *philippinensis* var. nov.

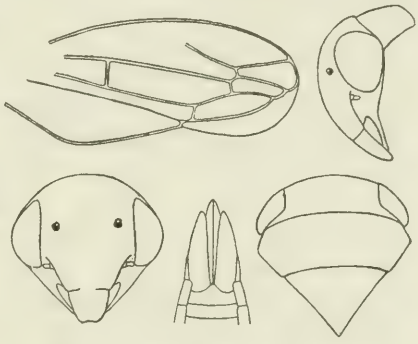

FIG. 8. *Busonia scutellaris* sp. nov.

Synopsis of Philippine species of Busonia.

a^1. Clypeus very broad, convex-sided, and rounded at tip; ocelli nearer to eyes than to median line; cross vein at base of first apical cell and venation proximad of this, obsolete; no subapical cells; the second apical cell broader at apex than at base, the third broader at base than at apex, and the fourth far longer than third; clavus not punctate ..... scutellaris sp. nov.

a^2. Clypeus narrow, concave-sided, and emarginate at tip; ocelli as near median line as to eyes; venation all distinct; one subapical cell; the second apical cell as broad at apex as at base, the third broader at apex than at base, and the fourth as long as third; clavus with very large dotted punctures..... mindanaensis sp. nov.

Busonia scutellaris sp. nov.

Length, 3.5 mm.; width of head, 1.3 mm. Color pale brown with a leaden cast on the pronotum; color of front shading into black on the clypeus (and with minute black spots at ocelli),

[3] *Notes Leyden Mus.* (1907), **29**, 165.

loræ, and margins of cheeks; apical half of scutellum, legs, meso- and metapleuræ with their sterna, and abdomen, except dorsal disk and genitalia, yellow; hind femora brownish toward tips. Tegmina pale brownish, the costal margin, as far as apical cell, blackish (with a narrow extension along base of first apical cell), the apical margin and appendix smoky, the region of outer apical cell semitransparent.

Head finely shagreened throughout, about equaling pronotum in width, length of vertex into width between eyes two and a half times, vertex distinctly longer at middle than at eyes. Face about as broad as long; ocelli nearer to eyes than to median line; distance between ocelli once and a half the width of clypeus at base; supra-antennal ridges not reaching eyes; frontoclypeal suture obsolete at middle; clypeus very broad at base, gradually narrowed to the somewhat emarginate apex; loræ small, nearly as long as clypeus, but scarcely more than a fifth the width. Width of pronotum two and three-fourths times the length, the length once and a half that of the vertex, anterior and posterior margins subparallel and very gently curved; surface finely, evenly shagreened. Scutellum as long as pronotum and about one half of vertex together; the transverse impressed line strongly, angularly bent, the surface distinctly shagreened only on areas of basal lunulæ, posterior area medially finely carinate. Tegmina impunctate, smooth; radial and claval veins subobsolete; third apical cell narrowed to apex. Hind margin of anal segment of female strongly, medially produced.

MINDANAO, Butuan (*coll. Baker*).

This species closely resembles *B. amentata* Dist. in coloration, but that species is described as having pronotum only slightly longer than vertex, the face yellowish toward apex instead of black, and the figure shows no extension of costal black on tegmina along base of first apical cell. Distant states that the color markings in Indian specimens are very constant.

Busonia mindanaensis sp. nov.

Length, 3.3 mm.; width of head, 1 mm. Ochraceous, genæ below antennæ to loræ black; scutellum brownish; meso- and metapleuræ black; legs very pale straw color; tegmina washed with pale golden brown, the costa basally dark brown to blackish, this color narrowly extended along base of first apical cell; a smoky area in apex of second apical cell, region of first apical cell clearer than elsewhere. Abdomen yellowish, dorsal disk blackish; last ventral segment and ovipositor brownish.

Vertex and upper part of face finely, transversely striate;

genæ with very coarse, oblique wrinkles between antennæ and outer margin; remainder of face finely shagreened. Head distinctly wider than pronotum; length of vertex into width between eyes little less than four times, its length at middle slightly more than at eyes. Face slightly broader than long, ocelli about as near to median line as to eyes; distance between ocelli two and a half times the width of clypeus at base; supra-antennal ridges reaching eyes; frontoclypeal suture distinct; clypeus small, narrow, broader at apex than at base, slightly emarginate at apex; loræ small but broad, more than half the width of clypeus. Width of pronotum two and one-fourth times the length, the length two and a half times that of vertex; anterior margin distinctly more strongly arcuate than posterior; surface coarsely shagreened. Scutellum as long as pronotum and one

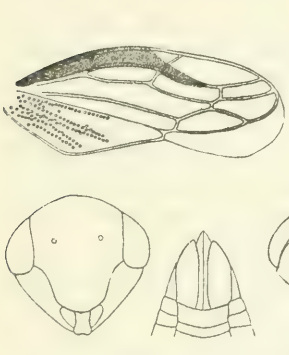

FIG. 9. *Busonia mindanaensis* sp. nov.

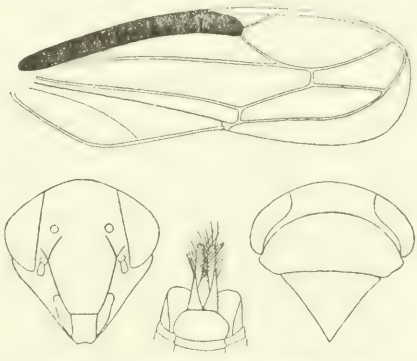

FIG. 10. *Balocha busonioides* sp. nov.

third of vertex together, entire surface of anterior field coarsely shagreened, posterior field minutely, transversely rugose; transverse impressed line slightly bent at middle, the lateral extremities transverse. Tegmina very coarsely thimble-pitted along the veins, these pits much more numerous and conspicuous on clavus and base of corium where they are centrally pimpled. Veins more distinct than in *B. scutellaris*, the third apical cell broadened apically. Last ventral segment and pygofers of female pale brown, and ovipositor dark brown, in striking contrast to color of remainder of venter. Hind margin of anal segment of female subtruncate.

MINDANAO, Iligan (*coll. Baker*).

These two species illustrate, at its best, the remarkable divergence in structural characters among some of these idiocerine insects, in spite of the unusual homogeneity in general habitus.

Genus **BALOCHA** Distant

The genus *Balocha* represents an extreme reduction in the venation of the tegmina, this being the only character of possibly generic value mentioned by Distant. I believe that the type should be reëxamined as to the exact form of the front, since the figure of the type shows a condition in the upper lateral sutures that is certainly open to question. The Philippine species placed here would be classified under *Busonia* in Distant's synopsis, and even resembles *Busonia* in color plan, but the facial characters in *Busonia* are unmistakable.

Balocha busonioides sp. nov.

Length, 4 mm.; width of head, 1.3 mm. Color sordid ochraceous above, very pale straw color below; head with two adjoining dark clouds on upper part of face, small black spots next ocelli, and dark clouds between ocelli and eyes; an indistinct and very oblique craticulum on front; pronotum olive-tinted; basal area of scutellum brownish; tegmina semitransparent with brown veins, tinted with golden brown, darker basally, costa broadly dark brown or black as far as the first apical cell; clavus with a narrow yellowish stripe lying next basal half of commissure; abdomen with more or less of dorsum and side plates of genitalia dark-colored; mesopleuræ with black spots.

Head and pronotum shagreened throughout, this shagreening somewhat transverse on vertex. Head distinctly wider than pronotum; length of vertex into width between eyes two and three-fourths times, its length at middle slightly greater than that at eyes. Face distinctly longer than broad; ocelli nearer to eyes than to median line; distance between ocelli nearly twice the width of clypeus at base; length of front once and a fourth the width; clypeus small, short, about as broad at apex as at base, tip emarginate; loræ longer than clypeus and about half as wide. Width of pronotum two and a half times the length, the length two times that of vertex; anterior margin slightly arcuated, posterior margin nearly straight. Scutellum as long as pronotum and one third of vertex together; surface evenly shagreened throughout; transverse impressed line strong, obtuse-angularly bent, apex widely open, the lateral limbs straight. Tegmina smooth, thin, with a few very minute punctures on clavus, which has only one evident discal vein. Hind margin of anal segment of male strongly rounded at sides, truncate medially; pygofers very slender, thin, twisted, and long-haired.

LUZON, Mount Maquiling (*coll. Baker*).

Genus **PEDIOSCOPUS** Kirkaldy

Following Kirkaldy's description, I had temporarily placed a number of Philippine insects in the genus *Pedioscopus*. A later comparison with specimens of *P. agenor* Kirk. (see figure) kindly sent to me by Mr. Frederick Muir, of the Hawaiian Sugar Planter's Association, makes this reference certain, and enables me to show that this genus is extensively represented in this Archipelago. It includes some of our most highly colored members of the family.

Synopsis of the Philippine species of Pedioscopus.

a^1. Vertex transversely wrinkled; second apical cell in tegmina not pedunculate; sides of front strongly angled below antennæ; head in female with four large, round black spots (lacking in male), and pronotum with two round black spots..... disjunctus sp. nov.

a^2. Vertex shagreened; sides of front not strongly angled below antennæ.

b^1. Pronotum far more than two times as long as vertex; length of vertex into width between eyes more than four times; second apical cell of tegmina not pedunculate; scutellum as long as pronotum and vertex together.

c^1. Loræ longer than clypeus; color yellowish ochraceous; length 3.5 mm ..... modestus sp. nov.

c^2. Loræ shorter than clypeus; color brownish ochraceous; length 5.3 mm..... maquilingensis sp. nov.

b^2. Pronotum distinctly less than two times as long as vertex; length of vertex into width between eyes little more or less than two times; second apical cell of tegmina pedunculate; scutellum shorter than vertex and pronotum together.

c^1. First apical cell about as broad as fourth, normal basally, not touching median vein subapically; ocelli nearer eyes than to median line.

d^1. Tegmina without black costa or apical black spot; clypeus white at extreme apex in female; hind margin of anal segment of female very slightly and broadly produced ..... similis sp. nov.

d^2. Tegmina with black costa and apical black spot; clypeus all black in female; hind margin of anal segment in female suddenly strongly produced to an emarginate apex. angustatus sp. nov.

c^2. First apical cell far broader than fourth, basally abnormal, broadly extended on to median vein subapically; ocelli as near to median line as to eyes.

d^1. Clavus all yellow, with a median, longitudinal black stripe. simplex sp. nov.

d^2. Clavus with basal half yellow, and wanting black stripe, sometimes part ivory-white or red-brown..... coloratus sp. nov.

Pedioscopus disjunctus sp. nov.

Length, 3.75 mm.; width of head, 1.25 mm. Ochraceous, in the female with black as follows: Two large, round spots on

pronotum, two on apex of head, two just within ocelli, apical margin of front, all of clypeus, and most of loræ and ovipositor; head in male lacking black. Tegmina with basal two thirds of costal vein, and a broad stripe along median vein as far as cross veins, black; corium within the black stripe, and all of clavus except commissure, opaque yellow; between the black stripe and costa, and the region of the apical cells, semitransparent.

Vertex, and face as far as ocelli, finely, transversely wrinkled, genæ coarsely but shallowly, obliquely wrinkled, remainder of face shagreened; head wider than pronotum; length of vertex into width between eyes little more than three times; length at middle distinctly greater than at eyes. Face about as broad as long, distance between ocelli more than three times the distance between ocelli and eyes, and more than three times the width

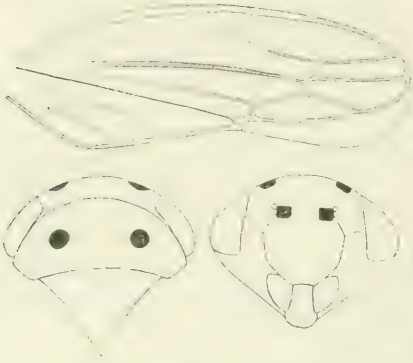

FIG. 11. *Pedioscopus agenor* Kirk.

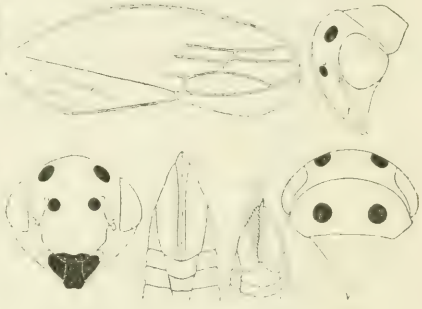

FIG. 12. *Pedioscopus disjunctus* sp. nov.

of clypeus at base; front slightly broader than long; clypeus broadened apically, and apical margin slightly emarginate; loræ as long as clypeus, and nearly as wide as clypeus at base. Width of pronotum two and a fourth times the length, the length two times that of vertex. Surface of pronotum and anterior field of scutellum very finely subobsoletely shagreened. Scutellum as long as pronotum and about a third of the vertex together; transverse impressed line short, straight; posterior field shallowly, transversely wrinkled. Tegmina with very minute, scattering, dark punctures along the claval veins; veins of corium subobsolete basally; second apical cell sessile. Hind margin of anal segment of female medially long and narrowly produced; pygofers slender and long-haired.

LUZON, Los Baños and Mount Maquiling (*coll. Baker*).

This species is close to *P. agenor* Kirk. in markings as well as in structure of tegmina.

Pedioscopus modestus sp. nov.

Length, 3.5 mm.; width of head, 1.3 mm. Color ochraceous, pronotum slightly darker, mesopleuræ black-spotted, abdomen more or less dark-colored at base and above, last ventral segment in male brown, hind tibiæ with large black spots at bases of spines, the second tarsal joint apically brown; tegmina washed with very pale brownish, nearly uniform throughout.

Head finely shagreened throughout, wider than pronotum; length of vertex into width between eyes more than four times; length at middle about the same as at eyes. Face a little longer than broad; distance between ocelli three times the distance between ocelli and eyes and once and a half the width of the clypeus at base; front about as broad as long; clypeus very broad, nearly as broad at base as at apex, the tip emarginate;

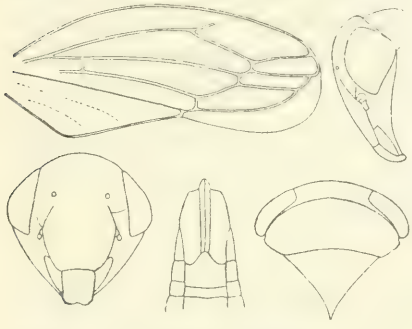

FIG. 13. *Pedioscopus modestus* sp. nov.

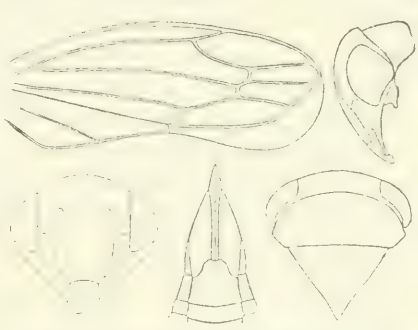

FIG. 14. *Pedioscopus maquilingensis* sp. nov.

loræ longer than clypeus but not one half as broad. Width of pronotum two and one-third times the length, length slightly more than three times that of vertex. Surface of pronotum and scutellum finely shagreened. Scutellum about as long as head and pronotum together; transverse impressed line evenly and gently arcuate. Tegmina with a few, remote, shallow punctures on clavus; second apical cell sessile. Hind margin of last ventral segment of female broadly long-produced medially, the side plates angled apically; hind margin of anal segment of male truncate.

MINDANAO, Butuan (*coll. Baker*).

A very common species, but very inconspicuous.

Pedioscopus maquilingensis sp. nov.

Length, 5.3 mm.; width of head, 1.9 mm. Color ochraceous; the scutellum, except margins, brownish, the basal lunulæ darker, and two brown spots just anterior to lateral extremities

of transverse impression; ovipositor brown. Tegmina semitransparent, washed with very pale brownish, the veins golden brown.

Head, pronotum, and scutellum finely shagreened; head wider than pronotum; length of vertex into width between eyes four times, the length at middle about the same as at eyes. Face a little longer than broad; distance between ocelli somewhat more than twice the distance between ocelli and eyes and once and a half the width of clypeus at base; front longer than broad; clypeus broad and short, a little broader apically than basally, the tip emarginate; loræ shorter than clypeus and one third as broad. Width of pronotum two and a half times the length, the length about two and a half times that of the vertex. Scutellum as long as pronotum and vertex together; transverse impressed line strongly, angularly bent, open at apex, the lateral limbs strongly arcuated. Tegmina without distinct punctures; second apical cell sessile. Hind margin of anal segment of female broadly, strongly, medially produced, the apex emarginate.

LUZON, Mount Maquiling (*coll. Baker*).

Pedioscopus maquilingensis is the largest species of the genus known in the Philippines. Peculiar to this species are the strongly curved supra-antennal ridges.

Pedioscopus similis sp. nov.

Length, 4.3 mm.; width of head, 1.3 mm. Color ochraceous, yellowish on pronotum and scutellum, basal half of clavus opaque yellow, this area distally irregularly abbreviated; corium semitransparent, faintly washed with brownish, the basal half of costa golden brown; small, round, blackened areas adjoining ocelli below; clypeus in female black, excepting the extreme tip (concolorous in male); ovipositor brown.

Head, pronotum, and scutellum finely shagreened throughout; head wider than pronotum; length of vertex into width between eyes two and one-fourth times; length at middle distinctly greater than at eyes. Face broader than long; distance between ocelli about three times the distance between ocelli and eyes and once and a third the width of clypeus at base; front about as broad as long; clypeus very broad, as wide basally as apically, the tip emarginate; loræ longer than clypeus and one third as broad. Width of pronotum three times the length, the length one and a fourth times that of the vertex. Scutellum as long as pronotum and two thirds of vertex together; transverse impressed line strongly, angularly bent, open at apex, the lateral limbs arcuate. Tegmina with a few, scattering, minute dark punc-

tures on the opaque yellowish part of clavus; second apical cell pedunculate. Hind margin of anal segment of female longer at middle than at sides and minutely emarginate at apex; hind margin of anal segment of male very strongly rounded, the pygofers thin, straight, and long-haired.

MINDANAO, Dapitan (*coll. Baker*).

A common species at Dapitan and well marked.

Pedioscopus angustatus sp. nov.

Length, 4.5 mm.; width of head, 1.3 mm. Pale brown; small elongated spots extending from ocelli toward scrobes, and clypeus, except base (in female), black; ovipositor black; tegmina semitransparent, washed with pale brown, darker basally, the basal half of costa blackish; a spot at apex of second apical cell smoky; clavus with inner half opaque yellowish, this area

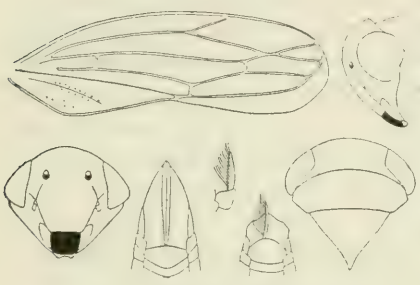

FIG. 15. *Pedioscopus similis* sp. nov.

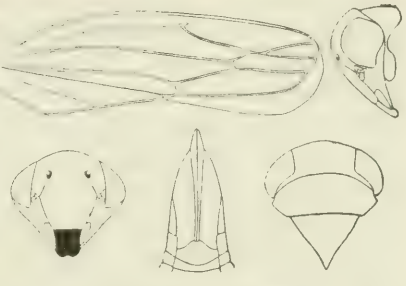

FIG. 16. *Pedioscopus angustatus* sp. nov.

reaching in an acute point to half the length of the commissure.

Head, pronotum, and scutellum finely shagreened throughout; head broader than pronotum; length of vertex into width between eyes one and four-fifths times, length at middle distinctly greater than at eyes. Face broader than long; distance between ocelli three times the distance between ocelli and eyes and once and a third the width of the clypeus at base; front about as broad as long; clypeus very broad, little widened apically, the tip emarginate; loræ about as long as clypeus and less than a third as broad. Width of pronotum two and three-fifths times the length, the length about one and one-fourth times that of vertex. Scutellum as long as pronotum and one half of vertex together; transverse impressed line strongly, angularly bent, open at apex, the lateral limbs arcuate. Tegmina with a few, scattering, minute, dark punctures on opaque yellowish part of clavus; second apical cell pedunculate. Hind margin of

anal segment of female strongly produced medially and emarginate at apex.

MINDANAO, Dapitan (*coll. Baker*).

Apparently not common. Closely related to *P. similis*.

Pedioscopus simplex sp. nov.

Length, 5.2 mm.; width of head, 1.6 mm. Color yellowish ochraceous; small basal lunulæ on scutellum, irregular spots, including the ocelli, apex of front, loræ except upper extremity, and all of clypeus (in female) black; mesopleuræ black-spotted; ovipositor black; corium semitransparent, washed with very pale brownish, clavus opaque yellow; basal two thirds of costa, a stripe along median vein extending to, and connecting with, a brownish spot in the second apical cell, brachial vein, and a longitudinal stripe passing through the clavus black.

Head, pronotum, and scutellum finely shagreened throughout; head wider than pronotum; length of vertex into width between eyes about two and one-fifth times, the length at middle distinctly greater than at eyes. Face broader than long; distance between ocelli two and a fourth times the distance between ocelli and eyes and once and a half the width of clypeus at base; front much longer than broad, clypeus very broad, broadened apically, the anterior margin only slightly incurved; loræ far longer than clypeus and about one half as broad. Width of pronotum about two and a half times the length, the length about once and two thirds that of the vertex. Scutellum as long as pronotum and a little more than half of vertex together; surface near impressed line broadly depressed, the impressed line angularly bent, apically open, the lateral limbs not arcuate. Tegmina with a few remote punctures on clavus; second apical cell long pedunculate. Hind margin of anal segment produced medially and emarginate at tip as in *P. coloratus*.

MINDANAO, Butuan (*coll. Baker*).

Pedioscopus coloratus sp. nov.

Length, 4.5 mm.; width of head, 1.3 mm. Color of head and all below ochraceous; pronotum and basal field of scutellum pale clear brown; apical field of scutellum yellowish; small, irregular, evanescent spots adjoining ocelli below, lower portion of front, clypeus (with sometimes loræ and lower portion of genæ), and ovipositor black (face concolorous in male); sides of dorsum dark brown; tegmina semitransparent, washed with very pale golden brown, darker basally, area of outer apical cell very clear, basal half of costa broadly, and the commissure, black; basal two thirds of clavus opaque yellow, often margined with ivory-white,

this area posteriorly subtruncate. Extreme tip of corium often more or less smoky.

Head, pronotum, and scutellum finely shagreened throughout; head wider than pronotum; length of vertex into width between eyes two and three-fourths times, length at middle distinctly greater than at eyes. Face as long as broad; distance between ocelli three times the distance between ocelli and eyes and once and a half the width of clypeus at base; front longer than broad; clypeus of medium width, about as wide apically as basally, apex rather sharply emarginate; loræ far longer than clypeus and about one half as broad. Width of pronotum two and a half times the length, the length less than twice that of vertex. Scutellum as long as pronotum and about one half of vertex together; surface broadly depressed at impressed line, this line angulately bent, open at apex, the lateral limbs not arcuate.

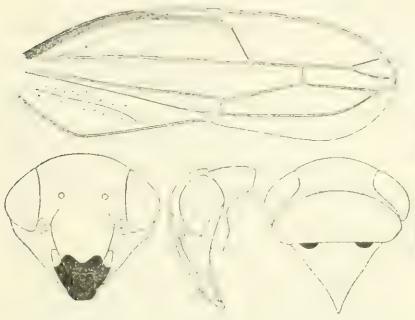

FIG. 17. *Pedioscopus simplex* sp. nov.

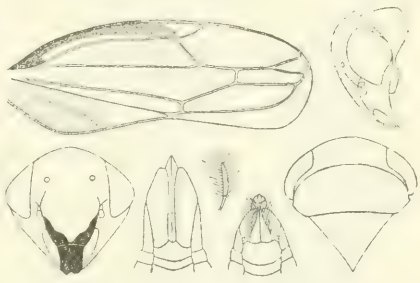

FIG. 18. *Pedioscopus coloratus* sp. nov.

Tegmina with a few, scattering, minute dark punctures on colored portion of clavus; second apical cell long pedunculate. Hind margin of last ventral segment of female long produced medially and slightly emarginate or entire at tip. Hind margin of anal segment of male sinuate, the pygofers very broad at base, narrowing to acute tips, the outer margins long-haired.

LUZON, Los Baños, Malinao; MINDANAO, Butuan (*coll. Baker*).

A common, widely distributed, and very variable species. The median vein of corium is often less darkened, and the yellow of clavus varies in intensity, sometimes being almost absent. Two very distinct varietal forms are worthy of special recognition. One of these (from Butuan, Mindanao) has very broad black commissural margins to anal portion of clavus and heavy black basal lunulæ on the scutellum. This may be designated as var. *mindanaensis* nov. The other (also from Butuan) has the anal two thirds of colored portion of clavus bright red-brown and the

remainder of this area—a broad band along claval suture—ivory-white. This form may be designated var. *bicolorata* nov.

This species must be nearly related to *Idiocerus unimaculatus* Melichar, which is probably congeneric with it.

Genus IDIOSCOPUS novum

As a generic group *Idioscopus* is as distinct as *Busonia, Chunra, Pedioscopus,* etc., and I am surprised that Distant did not separate it. The habitus is not at all that of typical *Idiocerus,* the head being larger, narrower, and longer as seen from above, usually distinctly longer at middle than at eyes, and long in proportion to width between eyes. The first apical and first subapical cells are normally confluent.

Type, *Idiocerus clypealis* Leth. as here described.

Synopsis of the Philippine species of Idioscopus.

a^1. Length of pronotum about three times that of vertex; width of vertex between eyes more than four times the length; two black spots on scutellum anteriorly, two spots on anterior margin of pronotum, and two on anterior margin of head; clypeus white apically in the female ..... palawanensis sp. nov.

a^2. Length of pronotum little more or less than two times that of vertex; width of vertex between eyes less than three times the length; clypeus all black in female.

b^1. Vertex and pronotum in male without spots; scutellum with two black spots anteriorly ..... clypealis Leth.

b^2. Vertex in male with two black spots, pronotum with two spots behind anterior margin; scutellum basally with a single, large, median black spot ..... tagalicus sp. nov.

Idioscopus palawanensis sp. nov.

Length, 4.25 mm.; width of head, 1.5 mm. Ochraceous, olive-tinted on vertex and pronotum; basal field of scutellum reddish brown; large basal lunulæ on scutellum, small pronotal lunulæ back of eyes, two spots on anterior margin of head, small dots inclosing ocelli, basal two thirds of clypeus, spot on mesopleuræ, and the ovipositor black; antennal scrobes darkened; tegmina golden brown, paler apically, the region of outer apical cell clearer; costa broadly, alternately yellow and brown to the outer apical cell.

Vertex, and face to just below upper black spots, finely, transversely striate, remainder shagreened; head wider than pronotum; length of vertex into width between eyes four and one-third times; length at middle nearly the same as at eyes. Face slightly longer than broad; distance between ocelli two and a half times the distance between ocelli and eyes and twice the width of

clypeus at base; front slightly broader than long; clypeus of medium width, about as wide basally as apically, apex truncate; loræ much longer than clypeus and two thirds as broad. Width of pronotum two and a half times the length, the length slightly less than three times that of the vertex. Scutellum as long as pronotum and about one half of the vertex together; transverse impressed line obtuse-angularly bent, the apex open, the lateral limbs not arcuate; surface just posterior to impressed line with a few, shallow, transverse wrinkles. Tegmina distinctly thickened and roughened on basal half, this area having numerous strong punctures along the veins. Hind margin of anal segment slightly produced medially.

PALAWAN, Puerto Princesa (*coll. Baker*).

Idioscopus clypealis Leth.

Colors as described by Distant. He does not state that it is the male which lacks the two spots on anterior margin of head,

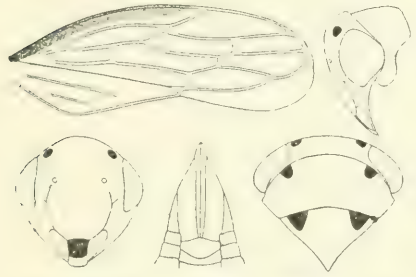

FIG. 19. *Idioscopus palawanensis* sp. nov.

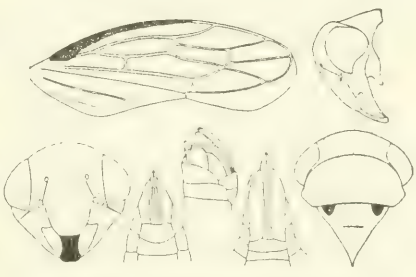

FIG. 20. *Idioscopus clypealis* Leth.

this being a sexual character. The clypeus in my specimens is uniformly black. The female also possesses two small black spots between the ocelli, as shown in Distant's figure, where the ocelli, laterad of the spots, are not shown.

Vertex, and face to just below upper black spots, finely, transversely striate, remainder shagreened; head wider than pronotum; length of vertex into width between eyes two and one-fourth times, length at middle distinctly greater than at eyes. Face somewhat broader than long; distance between ocelli two and two-thirds times the distance between ocelli and eyes and about twice the width of clypeus at base; front longer than broad; clypeus of medium width, slightly broader apically than basally, tip gently emarginate; loræ far longer than clypeus and nearly as broad. Width of pronotum little more than twice the length, the length little more than twice that of vertex. Scutellum as long as pronotum and three fifths of the vertex together; trans-

verse impressed line very obtusely bent, open apically, the lateral limbs not arcuate, the surface just posterior to this with a few, shallow, transverse wrinkles. Tegmina with subobsolete punctures along the veins on basal half, those on the yellowish costa minute and dark. Hind margin of anal segment of female gently bisinuate to subtruncate, in the male subtruncate. Pygofers slender at base, compressed, subspatulate.

LUZON, Los Baños (*coll Baker*). Occurring in swarms on mango flowers and probably fully as injurious as *Chunra niveosparsa*.

Idioscopus tagalicus sp. nov.

Length, 5 mm.; width of head, 1.8 mm. Ochraceous, olive-tinted on pronotum, scutellum yellow; a large, median, basal spot on scutellum, two small spots near anterior margin of pro-

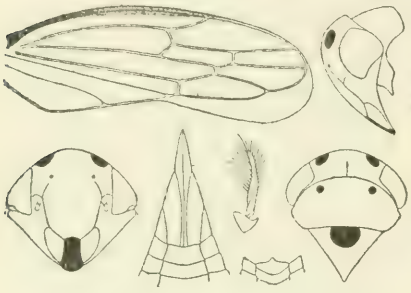

FIG. 21. *Idioscopus tagalicus* sp. nov.

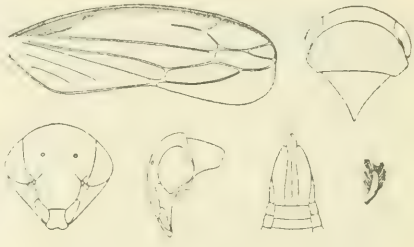

FIG. 22. *Idiocerinus melichari* sp nov.

notum (sometimes absent), two large spots on anterior margin of head, clypeus (concolorous in male), and ovipositor black; corium semitransparent, faintly tinted with brownish, more or less smoky-tipped, the middle third of costa and a broad stripe adjoining claval commissure and reaching half the length of clavus black or piceous; clavus opaque yellow; punctures along veins few and shallow on the basal half of tegmina.

Vertex, and face nearly to ocelli, finely, transversely striate, remainder shagreened; head wider than pronotum; length of vertex into width between eyes two and a half times, the length at middle distinctly greater than that at eyes. Face slightly broader than long; distance between ocelli two and one-third times the distance from ocelli to eyes and two and a half times the width of clypeus at base; front about as broad as long; clypeus narrowed to base, the apex suddenly broadened, the tip broadly, evenly rounded; loræ longer than clypeus and broader than clypeus at middle. Width of pronotum two and one-fourth

times the length, the length a little less than two times that of the vertex, surface uniformly finely shagreened. Scutellum as long as pronotum and about one fifth of the vertex together; surface coarsely, irregularly shagreened on basal field; transverse impressed line obtuse-angularly bent, open at apex, lateral limbs not arcuate. Hind margin of anal segment of female subtruncate, in male medially, narrowly, acutely produced. Pygofers twisted, apical half uniformly narrowed.

LUZON, Mount Maquiling and Mount Banahao (*coll. Baker*).

Genus **IDIOCERINUS** novum

The two species here described under the new genus *Idiocerinus* present a form of front not noted by me in any other Philippine idiocerine insects. The clypeus is shorter for its width than is to be found elsewhere. Otherwise it is much more like *Idioscopus* and *Pedioscopus* than like typical *Idiocerus*. It includes the most delicately beautiful idiocerine insects in the Philippine fauna. *Idiocerus stali* of Fieber is apparently to be referred here.

Type, *Idiocerinus melichari* sp. nov.

Synopsis of the Philippine species of Idiocerinus.

a^1. Head and pronotum shining ochraceous, the latter and scutellum tinted with reddish brown; tegmina smoky, the veins concolorous; hind margin of anal segment of female truncate, the side plates not carinate..... melichari sp. nov.

a^2. Head and pronotum shining pearly; tegmina subhyaline, the veins basally orange; hind margin of anal segment of female medially produced and emarginate, the side plates strongly carinate. nacreatus sp. nov.

Idiocerinus melichari sp. nov.

Length, 4 mm.; width of head, 1.3 mm. Ochraceous, tinted with reddish brown on pronotum and scutellum. Tegmina semitransparent; corium very slightly tinted with pale brownish, only the inner veins distinct, the median vein broadly blackened throughout its length; clavus opaque golden brown; punctures obsolete.

Vertex, and face to near ocelli, sharply and strongly cross striate, the striæ on face strikingly oblique (a rare condition in the Idiocerini); length of vertex into width between eyes about five times, the length at middle very slightly greater than that at eyes. Face about as broad as long; distance between ocelli once and a half the distance between ocelli and eyes and about once and a half the width of clypeus at base; clypeus very short, broadened toward tip, where it is slightly emargi-

nate; loræ as long as clypeus, about two thirds as wide, and with outer margin incurved. Width of pronotum two times the length, the length three and a half times that of the vertex; surface very finely shagreened. Scutellum very finely shagreened, the impressed line very inconspicuous and nearly straight; the length equaling that of pronotum; corium with second apical cell pedunculate. Hind margin of anal segment of female truncate. Pygofers of male with slender bases, gradually narrowed apically where the tip is upturned.

LUZON, Mount Maquiling (*coll. Baker*).

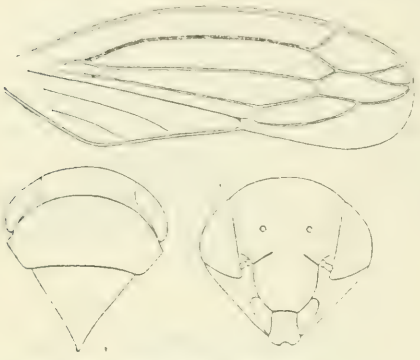

FIG. 23. *Idiocerinus nacreatus* sp. nov.

Idiocerinus nacreatus sp. nov.

Length, 4 mm.; width of head, 1.3 mm. Head, thorax, and legs pearl white; tegmina semitransparent, with basal third washed with orange, postnodal veins orange.

Head sculptured as in *I. melichari;* length of vertex into width between eyes about three and one-third times, length at middle distinctly greater than at eyes. Face about as broad as long; distance between ocelli once and a half the distance between ocelli and eyes and once and a half the width of clypeus at base; clypeus as in *I. melichari;* loræ as long as clypeus and about two thirds the width, the outer margins not incurved. Width of pronotum two and a fourth times the length, the length two and a half times that of vertex; surface finely shagreened. Scutellum as long as pronotum and one half of vertex together, sculptured as in *melichari.* Corium with second apical cell pedunculate. Genitalia of female as in *melichari,* but side plates strongly, discally carinate.

LUZON, Mount Maquiling (*coll. Baker*).

ILLUSTRATIONS

TEXT FIGURES

FIG. 1. *Iposcopus distanti* sp. nov.
2. *Iposcopus breviceps* sp. nov.
3. *Ipo conferta* Kirk.
4. *Ipocerus kirkaldyi* sp. nov.
5. *Chunra niveosparsa* Leth. var. *lagunensis* var. nov.
6. *Chunra niveosparsa* Leth. var. *palawanensis* var. nov.
7. *Chunra niveosparsa* Leth. var. *philippinensis* var. nov.
8. *Busonia scutellaris* sp. nov.
9. *Busonia mindanaensis* sp. nov.
10. *Balocha busonioides* sp. nov.
11. *Pedioscopus agenor* Kirk.
12. *Pedioscopus disjunctus* sp. nov.
13. *Pedioscopus modestus* sp. nov.
14. *Pedioscopus maquilingensis* sp. nov.
15. *Pedioscopus similis* sp. nov.
16. *Pedioscopus angustatus* sp. nov.
17. *Pedioscopus simplex* sp. nov.
18. *Pedioscopus coloratus* sp. nov.
19. *Idioscopus palawanensis* sp. nov.
20. *Idioscopus clypealis* Leth.
21. *Idioscopus tagalicus* sp. nov.
22. *Idiocerinus melichari* sp. nov.
23. *Idiocerinus nacreatus* sp. nov.

NOTES ON JAPANESE LEPIDOPTERA AND THEIR LARVÆ: PART III *

By A. E. Wileman
(*Manila, P. I.*)

THREE COLORED PLATES

HETEROCERA

BOMBYCIDÆ

Genus **THEOPHILA** Moore

Theophila Moore, Proc. Zool. Soc. Lond. (1867), 683.

Theophila falcigera Butler.

Plate I, fig. 1, young larva; fig. 2, food plant; fig. 3, adult larva; fig. 4, head and thoracic segments.

Japanese name, *ō-kuwa modoki.*

Lagyra falcigera Butler, Ill. Typ. Lep. Het. (1878), 2, 45, Pl. 35, fig. 4, ♀; Pryer, Trans. Asiat. Soc. Japan (1883), 12, No. 204.

Oberthüria falcigera Matsumura, Cat. Insect. Jap. (1905), 1, 48.

Hyposidra falcigera Leech, Ann. & Mag. Nat. Hist. (1897), VI, 19, 314; Matsumura, Thousand Insects of Japan [Nihon Senchū Dzukai (Jap.)] (1909), suppl. 1, 50, Pl. 8, fig. 6, ♀.

=? *Euphranor caeca* Oberth., Etud. d'Ent. (1880), 5, 40, Pl. 6, fig. 11, ♂.

=? *Oberthüria caeca* Stgr., Rom. Mém. Lép. (1892), 6, 337; Stgr. and Reb., Cat. Lep. Pal. (1901), 1, 128, No. 1044; Grünberg, Seitz's Macrolep., Faun. Pal. (1911), 1, 190, Pl. 35e.

=? *Oberthuria rutilans* Grünberg, Seitz's Macrolep., Faun. Pal. (1911), 1, 190 (ab. of *caeca.*)

=? *Andraca gracilis* Butler, Cist. Ent. (1885), 3, 125, No. 22; Leech, Proc. Zool. Soc. Lond. (1888), 625, No. 217; Leech, Trans. Ent. Soc. Lond. (1898), 272; Grünberg, Seitz's Macrolep., Faun. Pal. (1911), 1, 190.

The larva figured (Plate I, figs. 1 and 3) was taken in August, 1902, at Hakodate, Oshima Province, Hokkaido (Yezo), on *itaya-kaede,* a species of maple (*? Acer pictum* Thunb.). The artist figured the larva in the young stage on August 13, 1902, and again in its full-grown stage on August 27, 1902. No record

* The first paper of this series was printed in *This Journal, Sec. D* (1914), 9, 247–268, 3 pls.; part II, in (1915), 10, 281–306, 3 pls.

was made of the date of pupation, but a female imago emerged July 7, 1903, which I identified at the British Museum (Natural History) as *Lagyra falcigera* Butl. It also agrees well with Butler's figure, which is that of a female. The larva figured is the only one of this species I have ever taken or seen and attracts particular attention on account of its peculiar cobra-like thorax.[1] The head is retractile and, together with segments 2 and 3, can be almost entirely withdrawn into segment 4, giving the larva the appearance of a cobralike serpent. Poulton alludes to similar instances in larvæ when discussing protective mimicry, instances in which "the defenceless form lives upon the reputation of some dangerous animal belonging to another subkingdom. * * * Such caterpillars terrify their enemies by the suggestion of a cobra-like serpent." He gives as illustrations the larvæ of *Chaerocampa elpenor* and *Chaerocampa porcellus*.[2] The particular form of protective mimicry suggested by the larva of *Theophila falcigera* should probably be classed under pseudaposematic colors.[3]

Larva.—The following description of the larva is taken from my original figure: Length, full-grown about 55 millimeters. Anterior or thoracic segments—namely 2, 3, 4—broadly light olive with expanded ochraceous lobes on segments 4 and 5; olive dorsal stripe; lateral ground color whitish olive with darker olive streaks; a yellowish oblique stripe on segments 9 and 10, running down the side of proleg on segment 10; caudal horn thick at base and olive-colored, tapering to a slender yellowish filament at the apex; spiracles black. (In this description the head is taken as the first segment.) The young larva is much darker in color and the caudal horn is somewhat longer. When the larva is not feeding, it very often hangs from the leaf head downward and in this position mimics a dead leaf.

Butler places the present species in the genus *Lagyra* Walker, among the Geometridæ. Leech also places it among the Geometridæ, but in the genus *Hyposidra* Guénée. There is no doubt, however, that the larva has no affinity with this family, but that its proper place is among the Bombycidæ, where the species is placed in the British Museum (Natural History) under the genus *Theophila* Moore, to which I have accordingly assigned it.

Butler's type of *L. falcigera*, a female, came from Hakodate, Hokkaido (Yezo), and there appears to be no male specimen in

[1] See previous papers for nomenclature of segments.

[2] The Colours of Animals. 2d ed. London (1890), 257–259, figs. 55–56.

[3] See Wileman, *This Journal, Sec. D* (1914), 9, table I, facing p. 248.

the British Museum collection. Staudinger remarks that the female of *falcigera* Butler appears to be the female of *Euphranor caeca* Oberthür (the type of which is a female), or of a species very closely allied to the latter. I am inclined to share the same opinion and have provisionally included *E. caeca* as a synonym of *T. falcigera*. *Euphranor caeca* is placed by Staudinger and Seitz in *Oberthüria* of the Bombycidæ. Possibly *falcigera* is referable to this genus and not to *Theophila*, as the larvæ of *Theophila falcigera* and *Theophila mandarina* are very different in form and color, although they have this special point in common that they both exhibit the same form of protective mimicry alluded to by Poulton under pseudaposematic colors.[4]

Theophila mandarina has two eyelike spots on each side of segment 4, which is much swollen, and when segments 1 (head) to 3 are withdrawn into segment 4, the larva assumes the threatening snakelike attitude of a *Chaerocampa* larva alluded to by Poulton.[5]

I am also inclined to think that *Andraca gracilis* Butler, the type of which is a female, is a form of *falcigera* Butler. *Andraca gracilis* is possibly the normal female of *caeca* (= *falcigera*), while the typical female *falcigera* is probably a dark variety. I have only one male specimen of *falcigera*, taken at Tobetsu, Hokkaido (Yezo), July 20, 1902, which agrees in markings with Oberthür's male *caeca*, but not in size nor in color. I am inclined to think that *caeca* is merely a light fawn-colored ("fauves ailes") form of *falcigera*.

Butler's type of *Lagyra falcigera* (♀) was from Hakodate, Hokkaido (*Whitely*). Butler's type of *Andraca gracilis* (♀) was from Nikko, Honshu (*Pryer*). Oberthür's type of *caeca* (♂) was from Askold Island, eastern Siberia. Askold Island is situated on the coast opposite Hokkaido (Yezo).

Pupa.—The pupa is inclosed in a smooth, light golden brown, semitransparent cocoon, stiff in texture. It has a transverse slit at the top like the cocoon of *Rhodinia fugax* Moore, which belongs to the Saturniidæ.

Local distribution.—Theophila falcigera: Hokkaido (Yezo), Junsai Numa, near Hakodate, July, 1 male, 1 female. Matsumura records the species from Hokkaido (Yezo) and Honshu.

General distribution.—Theophila caeca, eastern Siberia (Ussuri?); *T. falcigera*, Japan; *T. gracilis*, Japan.

[4] See Wileman, loc. cit. [5] Loc. cit.

Theophila mandarina Moore.

Plate II, fig. 5, larva; fig. 6, food plant.

Japanese names, *kuwago; yama-kaiko.*

Theophila mandarina Moore, Proc. Zool. Soc. Lond. (1872), 576, Pl. 33, fig. 5; Seitz, Macrolep., Faun. Pal. (1911), 1, 190, Pl. 351, ♂.

Bombyx mandarina Leech, Proc. Zool. Soc. Lond. (1888), 626,No. 222; Leech, Trans. Ent. Soc. Lond. (1898), 271, No. 22; Matsumura, Injurious Jap. Insects (Nihon Gaichūhen) (1899), 55, fig. 1, imago, ♂; fig. 2, ovæ; fig. 3, larva; Matsumura, Cat. Insect. Jap. (1905), 1, 48, No. 391; Matsumura, Thousand Insects of Japan [Nihon Senchū Dzukai (Jap.)] (1909), suppl. 1, 138, Pl. 13, fig. 18, ♂.

Bombyx fuscata Motsch., Bull. Soc. Nat. Mosc. (1866), 39, 1, 192.

The larva figured (Plate II, fig. 5) was taken September 8, 1902, at Hakodate, Oshima Province, Hokkaido (Yezo), on mulberry, named in Japanese *kuwa.* This larva died without passing through its metamorphoses, but I bred one male and three females from similar larvæ, which are common on mulberry trees.

Larva.—The following description of the larva is taken from my original figure: Color, grayish brown; segments 4 and 5 abnormally distended dorsad; on segment 4 a subdorsal, black ocelluslike spot, ringed internally with red and externally with black; on segment 6 a black ocelluslike spot, ringed internally with gray and externally with black; a short caudal horn.

This larva is another striking example of the form of protective mimicry exhibited by its near ally *Theophila falcigera* Butler, which has been alluded to in the notes on the latter species.

Matsumura [6] records the life history of this species under *Bombyx mori* var. *mandarina* Moore and gives figures of the ovæ, larva, and male imago.

He says that in Hokkaido it is single-brooded and hibernates in the ova stage. The ovæ, which are deposited in rows on mulberry twigs, hatch in the following spring. The larva spins its cocoon after the fourth molt in precisely the same way as the domesticated silkworm, *Bombyx mori* Linn. However, owing to the fact that it lives in a wild state, it takes a longer time in attaining full growth and does not spin its cocoon until the end of July or the beginning of August. The cocoon, which is of an ashy white or ashy yellow color, is spun in a curled up leaf, and the imago emerges in about two weeks.

Pupa.—The pupa is inclosed in a flimsy yellowish cocoon spun in the leaves of the mulberry. It is of no use for silk, as the thread cannot be reeled.

[6] Injurious Jap. Insects (Nihon Gaichūhen) (1899), 55, Pl. 24, figs. 1 to 3.

Leech remarks that *Bombyx mandarina* is "probably the wild form of *Bombyx mori.* In color the imago is darker and the markings are distinct, the female is much larger than the same sex of *B. mori.*" I have captured it in Honshu and Hokkaido (Yezo) in June, August, October, and November, and Matsumura records it from Hokkaido (Yezo), Honshu, Shikoku, and Kyushu, and Seitz records it from eastern China, Korea, and Japan.

Seitz states that *Bombyx fuscata* Motschulsky from Japan appears, according to the descriptions, to be only a dark form of *mandarina.*

GEOMETRIDÆ

GEOMETRINÆ

Genus **EUCHLORIS** Hübner

Euchloris HÜBNER, Verz. Bek. (1827), 283.

Euchloris difficta Walker.

Plate I, fig. 5, larva, lateral aspect; fig. 6, larva, dorsal aspect.

Japanese name, *shirofu-aoshaku.*

Comibaena difficta WALK., Cat. Lep. Het. (1861), 22, 576; BUTLER, Ill. Typ. Lep. Het. (1879), 3, 37, Pl. 50, fig. 3, ♂.

Euchloris difficta LEECH, Ann. & Mag. Nat. Hist. (1897), VI, 20, 236; MATSUMURA, Cat. Insect. Jap. (1905), 1, 117, No. 1006; NAGANO, Insect. World [Konchū Sekai (Jap.)] (1909), 13, 91, Pl. 5, figs. 1 to 8, larva, pupa, imago, ♂ ♀.

Phorodesma gratiosaria BREM., Lep. Ost.-Sib. (1864), 77, Pl. 7, fig. 1, ♀ (teste Warren).

Ochrognesia difficta WARREN, Nov. Zool. (1894), 1, 391.

The larva figured (Plate I, figs. 5 and 6) was taken in May, 1901 (figured May 5), at Kobe, Settsu Province, Honshu, on willow; Japanese name, *yanagi.*

This larva was unfortunately thrown away with old dry leaves when changing the daily supply of food, and I was never able to discover another larva to breed and compare with the figure drawn by my artist. I was much vexed that I did not have an opportunity of further observing it, as it is a most striking example of procryptic colors affording special protective resemblance.

Poulton defines this class of resemblance as "resemblance in shape and outline, as well as in color, to some object in the environment as a protection against enemies." [7]

In this case the larva both in shape and outline mimics, or

[7] See Wileman, loc. cit.

resembles, the unexpanded leaf buds of the willow and thus effects concealment from its enemies.

Fortunately, owing to the researches of Nagano, the well-known authority on Japanese lepidopterous larvæ, I am now able to give the figure of this larva, which has been identified by me from Nagano's figures as that of *Euchloris difficta* Walker. Nagano has published a description of the larva and its habits, accompanied by three figures representing its dorsal and lateral aspects.[8]

The figures of my larva agree very well with those given by him, and I have no doubt as to its identity. Nagano, however, has not succeeded in portraying so faithfully, as has my artist, the exact mimetic resemblance of this larva to the unexpanded leaf buds of a willow. The figure in my plate (fig. 6) represents the larva at rest, and in this position, while it lies flat along the willow twig, it exactly resembles willow buds in various stages of expansion. The caudal lobes of the larva, which are green, represent the more developed stage of the buds; the cephalic lobes, the undeveloped buds. This position imparts to it a most deceptive protective resemblance and thus secures it immunity from its enemies when it is quiescent.

Larva.—The following description is taken from my original figure: Length, 32 millimeters. Segments 2 to 9 acutely bilobed; the lobes of segments 2 to 5 brownish black, those of segments 6 to 8 green; segments 9 to 11 brownish black; with pale mediodorsal and spiracular stripes; ventrum brownish black.

Leech states that Warren considers *Phorodesma gratiosaria* Bremer, from eastern Siberia, as identical with *Euchloris difficta.* A comparison of Nagano's figures of the male and female imagoes of *difficta* with the female imago figured by Bremer seems to confirm this opinion and, therefore, I have included *gratiosaria* as a synonym of *difficta.*

Nagano states that he has not discovered the ova of this species, but that the larva probably hatches in April, feeding on *kawa-yanagi* and *kōri-yanagi.* Matsumura in his Catalogue of Japanese and foreign plants of Japan gives *Salix purpurea* L. as the botanical name of kawa-yanagi and *S. purpurea* var. *multinervis* Fr. and Sav. as that of kōri-yanagi; both are willows. My larva was taken some time previous to May 5, when it was figured. The insect pupates from May to June and the adult emerges from June to July. Nagano took his specimen May 19; it pupated June 2, and the adult emerged June 20. Nagano

[8] *Insect World* (Konchū Sekai) (1909), 13, Pl. 5, figs. 1–8.

also thinks that *E. difficta* is not properly placed in the genus *Euchloris,* as the larva differs very much in appearance from those of other species of the genus found in Europe. Probably the ova passes the winter without hatching, or there may be a second brood later in the year.

Leech records the species from northern and central China, eastern Siberia, Korea, and Japan.

Genus **MEGALOCHLORA** Meyrick

Megalochlora MEYRICK, Trans. Ent. Soc. Lond. (1892), 95.

Megalochlora valida Felder and Rogenhofer.

Plate I, fig. 7, larva; fig. 8, food plant; fig. 9, head.

Japanese name, *schiroseuji-aoshaku.*

Geometra valida FELD. and ROGENH., Reise der Novara (1875), 5, Pl. 127, fig. 37.

Megalochlora valida STGR., Iris (1897), 10, 1; STGR. and REB., Cat. Lep. Pal. (1901), 1, 262; MATSUMURA, Cat. Insect. Jap. (1905), 1, 116, No. 1001; PROUT, Seitz's Macrolep. of the World (1912), 4, Pl. 1, fig. 1, ♂; SASAKI, Insects Injurious to Japanese Trees [Nihon Jūmoku Gaichūhen (Jap.)] 3d ed. (1910), pt. 2, 47, Pl. 96, larva, pupa, imago, ♂.

Geometra dioptasaria CHRIST, Bull. Mosc. (1890), 9.

The larva figured (Plate I, fig. 7) was taken in April, 1901, at Kobe, Settsu Province, Honshu, on dwarf oak, Japanese name, *kunugi* (*Quercus serrata* Thunb.), and a male imago was bred from it June 1, 1901.

The coloration of this larva is an example of procryptic colors, affording special protective resemblance.[9] In this case the larva mimics the young leaf buds and leaves of the oak as will be observed on reference to the figure. The color of the spines on segments 5 and 12, the lateral blotches on segments 9, 10, and 11, and the anal segment harmonize extremely well with the young leaf buds of the tree, which are of the same color, and render the larva difficult of discovery, although one may search very closely for it.

Larva.—The following description is taken from my original figure: Length, about 36 millimeters. Light green; paired dorsal tubercles on segment 3; two pairs of long dorsal spines on each of segments 5, 6, 7, 8, 9, and 12, those on segments 5 and 12 light red-brown, all the others light green tipped with brown; light red-brown lateral blotches on segments 9, 10, and 11; anal segment entirely light red-brown. It is appropriate to mention

[9] See Wileman, loc. cit.

here that the larva of the closely allied species *Megalochlora sponsaria* Bremer [10] is very similar to that of *M. valida*. However, it is much smaller, with only four pairs of dorsal spines all directed forward instead of six pairs as in *valida*. It is green without dark markings. I bred two imagoes from larvæ of *M. sponsaria* at Kobe on June 18, 1901, and July 21, 1902, respectively, but my artist did not figure the larva, so I think it advisable to mention the resemblance here.

Pupa.—The pupa of *M. valida* is green, sparsely spotted with black dots on the dorsum.

I have taken *valida* in Honshu Island in June and July only. Matsumura records it from Honshu and from eastern Siberia. The larva appears in April with the young buds of the oak, the pupa in May, and the imago in June and July. I have never taken specimens of the imago later than July; therefore it is probably single brooded.

GEOMETRIDÆ

BOARMIINÆ

Genus **AUAXA** Walker

Auaxa WALKER, Cat. Lep. Het. (1860), 20, 271.

Auaxa cesadaria Walker.

Larva of *Auaxa sulphurea* Butler. Plate II, fig. 1, larva; fig. 2, food plant; figs. 3, 4, larva, previous to pupation.

Japanese name, *ki-edashaku*.

Auaxa cesadaria WLK., Cat. Lep. Het. (1860), 20, 271.

Bizia sulphurea BUTLER, Ill. Typ. Lep. Het. (1878), 2, 47, Pl. 35, fig. 10.

Auaxa sulphurea LEECH, Ann. & Mag. Nat. Hist. (1897), VI, 19, 220; MATSUMURA, Cat. Insect. Jap. (1905), 1, 148, No. 1265.

The larva figured (Plate II, fig. 1) was taken in July (figured July 2), 1902, at Hakodate, Oshima Province, Hokkaido (Yezo), on wild rose; Japanese name, *no-bara* (*Rosa multiflora* Thunb.). It pupated July 6, and an adult female emerged August 3, 1902. Another female emerged from a larva (Plate II, figs. 3, 4) taken in May, 1901, at Kobe, Settsu Province, Honshu, and two males and one female from larvæ taken July 29 and 31, 1902.

Pupa.—The pupa is inclosed in a frail cocoon spun among rose leaves.

Larva.—The following description is taken from my original figure: Length, 37 millimeters. Pale green, a lateral series of four pairs of curved pink spines situated on segments 5, 6, 7, and 8; a pair of similar spines, submediad, on the dorsum

[10] Lep. Ost.-Sib. (1864), 77, Pl. 7, fig. 25.

of segment 12. These spines almost exactly mimic the young pink spines of the wild rose. The coloration of this larva seems to suggest procryptic colors, affording special protective resemblance.[11]

When this larva is hidden by the green leaves of the rose, it is most difficult of detection; lying, as it does, flattened against the rose twig, the resemblance of the pink spines to those of the rose completes the concealment. I have taken the imago in Hokkaido (Yezo), Honshu, Kyushu, and Shikoku in June, July, and August, and Leech records it from Honshu, Kyushu, and central and western China. The larva appears from June to July, the imago from June to August.

Leech [12] remarks that this species is "probably identical with *Auaxa cesadaria* Walker from China, the type of which I have not been able to discover." In the British Museum collection *Bizia sulphurea* Butler is placed as a synonym of *Auaxa cesadaria* Walker from China. However, I have named the larva as that of *Auaxa sulphurea*. Walker's [13] description agrees with Butler's figure.

NOCTUIDÆ

CATOCALINÆ

Genus **METOPTA** Swinhoe

Metopta SWINHOE, Cat. Het. Mus. Oxon. (1900), 2, 170.

Metopta rectifasciata Ménétries.

Plate II, fig. 7, larva; fig. 8, food plant.

Japanese name, *shirosuji-tomoye*.

Sipirama rectifasciata MÉN., Cat. Lép. Het. Mus. St. Pétersb. (1863), Pl. 17, fig. 6; MATSUMURA, Cat. Insect. Jap. (1905), 1, 96, No. 819.

Metopta rectifasciata HMSN., Cat. Lep. Phal. (1913), 12, 301, fig. 50.

Spirama rectifasciata LEECH, Trans. Ent. Soc. Lond. (1900), 575, No. 1325.

Calliodes rectifasciata LEECH, Proc. Zool. Soc. Lond. (1889), 545.

Spiramia japonica WLK., Cat. Lep. Het. (1865), 33, 948, nec Guén.

Spirama interlineata BUTL., Ann. & Mag. Nat. (1878), V, 1, 291; BUTL., Ill. Typ. Lep. Het. (1878), 2, 41, Pl. 34, fig. 2.

The larva figured (Plate II, fig. 7) was taken in September, 1902 (figured September 8), at Hokodate, Oshima Province, Hokkaido (Yezo), on *shiode?* (? *Smilax herbacea* Linn. var. *nipponica* Maxim.). I am not sure about the name of the food plant, but it was identified by my Japanese collector as shiode, for which the botanical name is given in J. Matsumura's Catalogue of Japa-

[11] See Wileman, loc. cit.

[12] *Ann. & Mag. Nat. Hist.* (1897), VI, 19, 220.

[13] Walker, Cat. Lep. Het. (1860), 20, 271.

nese and foreign plants. A male, which is of the *interlineata* form, emerged in the following year on June 19, 1903.

This larva is an example of the form of protective mimicry alluded to by Poulton under pseudaposematic colors,[14] which he defines as "an appearance which deceptively suggests something unpleasant, or dangerous to an enemy." In this instance the eye-like subdorsal spots probably suggest something unpleasant to its enemies, as in the case of *Theophila mandarina* and *Ophideres tyrannus*.[15]

Larva.—The following description is taken from my original figure: Length, about 45 millimeters. Color, shades of pinkish and chocolate brown; a broad pinkish brown mediodorsal fascia, marked medially with a series of darker diamond-shaped spots; head with a yellow longitudinal stripe laterad; from the center of the head caudad there runs a subdorsal chocolate-brown stripe, attenuated anteriorly and broadening toward the anal extremity; on segment 4 a midlateral dark blue ocelluslike spot on each side, ringed internally with ochraceous red and externally with black; a subdorsal minute white spot on each of segments 4 to 11; a yellow stripe on each of segments 8 and 9, extending from spiracles to end of prolegs; a lateral, whitish violet band from segment 8 to 11; dorsal shield on anal segment black.

Pupa.—Brownish black with a purple pruinescence.

Local distribution.—I have taken this species in the following localities: Honshu. Oyama, Sagami Province, May; Nikko, Shimotsuke Province, May, July; Dorokawa, Yamato Province, July. Kyushu. Beppu, Bungo Province, May; Iida-san, Higo Province, August. Leech records it from Tsuruga and Shimonoseki in Honshu, June, July. Matsumura records it from Honshu, Kyushu. Hampson records it from Hokkaido (Hakodate), Kyushu, and Honshu (from Tsuruga, Nikko, Yokohama).

General distribution.—Japan, Korea, northern and central China, and Formosa.

NOCTUIDÆ

Genus **OPHIDERES** Boisduval

Ophideres Boisduval, Faun. Ent. Madag. Lép. (1833), 99.

Ophideres tyrannus Guénée.

Plate III, fig. 1, larva, dorsal aspect; fig. 2, food plant; fig. 3, larva, lateral aspect.

Japanese name, *akebi-kohoha.*

[14] See Wileman, loc. cit. [15] See this article, pp. 347, 348, and 356.

Ophideres tyrannus GUÉN., Noct. (1852), 3, 110; HAMPSON, Moths India (1894), 2, 562; LEECH, Proc. Zool. Soc. Lond. (1889), 544, No. 326; LEECH, Trans. Ent. Soc. Lond. (1900), 577, No. 1329; STGR. and REB., Cat. Lep., Pal. (1901), 1, 247; MATSUMURA, Cat. Insect. Jap. (1905), 1, 98, No. 835; NAGANO, Nawa's Insect World [Konchū Sekai (Jap.)] (1908), 12, 315, 354, Pl. 8, figs. 1–9, larva, pupa, imago, ♀; NAGANO, Insect World (1912), 16, 41; MATSUMURA, Thousand Insects of Japan [Nihon Senchū Dzukai (Jap.)] (1910), suppl. 2, 1, Pl. 17, fig. 1, ♂; SASAKI, Insects Injurious to Fruit Trees [Kwajū Gaichūhen (Jap.)], 5th ed. (1911), 166, Pl. 50, imago.

Ophideres amurensis STGR., Rom. Mém. Lép. (1892), 6, 581; STGR. and REB., Cat. Lep., Pal., 1, 247; OBERTH, Etud. d'Ent. (1880), 5, 86 (= ? *fullonica* Linn.).

Adris tyrannus MOORE, Trans. Zool. Soc. Lond. (1881), 11, 69, Pl. 12, fig. 5.

The larva is figured in two positions (Plate III, figs. 1 and 3). The larvæ from which these figures were drawn were taken in September and October, 1900 (figured September 21 and October 1), at Yoshino, Yamato Province, Honshu, on a creeper with large golden yellow fruit, known in Japanese as *akebi* (*Akebia quinata* Decne.). I bred from them a male and a female imago, which emerged November 8, 1900, and December 4, 1900, respectively. These are apparently not referable to typical *Ophideres tyrannus*, but to the form described by Staudinger as var. *amurensis*. I also took the larva, which evidently belongs to the first brood at Yoshino, on May 12, and from it an imago was bred June 10, 1901. I found a green form of larva at Hakodate, Hokkaido (Yezo), in which the markings were rather more distinct than in the form figured, but this was not bred. It was feeding on barberry (*Berberis* sp.). Nagano,[16] who has written at some length on the transformations of this species, states that no fixed rule can be laid down as to the color of the larva, which varies according to its stage and the locality it inhabits.

Larva.—The following description is taken from my original figure: Length, about 67 millimeters. Blackish brown with a pink tinge dorsally; of a darker shade laterally; sprinkled with yellowish patches and dots; a conspicuous yellow patch on segment 10 spotted with the ground color; two prominent ocellus-like spots on segments 6 and 7, internally black, centered with blue, and ringed externally with a broad yellow circle; segment 12, humped. There seem to be two or three broods of the larva in the year.

[16] Nagano, *Insect World* (1908), 12, 315, 354, Pl. 8, figs. 1–9, larva, pupa, imago, ♀.

This larva is an example of the form of protective mimicry alluded to by Poulton under pseudaposematic colors.[17]

Poulton [18] mentions and gives a figure of an Indian larva, a species of *Ophideres* allied to *O. tyrannus*, which possesses terrifying eyelike spots similar to those of the larva of *tyrannus*, and which assumes a terrifying attitude—

> by doubling the front part of its body beneath the rest, the bend being made at the spot where the eye-like marks are placed so that the latter are brought into an appropriate position at the anterior end, while the real head is, of course, concealed under the body.

This attitude, which is also assumed by *O. tyrannus*, is well figured by Nawa.[19] When the larva wishes to assume a terrifying attitude, it elevates the anal segments and doubles segments 1 to 5 beneath the succeeding ones, making the eyelike spots on segments 6 and 7 very conspicuous. My artist has not figured *tyrannus* in a terrifying attitude, but it will be noted that in Plate III, fig. 3, the anal segments are elevated, giving also a minatory aspect to the posterior segments of the larva, so that it is apparently protected fore and aft.

The imago lies concealed in dark places in the daytime, and can only be taken by beating, as it does not come to light nor to sugar. It is commonly known among professional Japanese collectors as *ki-no-ha tora*, or the leaf tiger, as when at rest it resembles a dead leaf. The orange underwings are exposed only in flight and are then very conspicuous. This species, therefore, is protected in both the larval and imago stages.

Leech remarks:

> the primaries of the wings of the imago vary considerably in tint and in the amount of green markings and some specimens seem to agree with the form described by Staudinger as var. *amurensis*, in which the primaries are unicolorous brown, darker than is usual in typical examples. There are all intergrades, between this form and the type occurring in China.

Matsumura records *Ophideres tyrannus* from Hokkaido (Yezo), Honshu, and Kyushu and from India and China. He records var. *amurensis* from Japan and eastern Siberia (Ussuri, Amurland). I have captured it in Honshu during all months from May to December, with the exception of July.

Sasaki [20] states that the larva appears about July and feeds

[17] See Wileman, loc. cit.

[18] Colours of Animals (1890), 263, fig. 57, Indian larva (*Ophideres*). This is probably the Indian form of *O. tyrannus*, which is also recorded from Calcutta and the Himalayas.

[19] *Insect World* (Konchū Sekai) (1912), 16, 41 (woodcut); Ibid. (1908), 12, Pl. 8, fig. 3.

[20] Insects Injurious to Fruit Trees (Kwajū Gaichūhen) (1911), 167.

on akebi and also on *hiragi-nanten* (*Berberis bealei* Fort.), and that the imago appears from the end of August to December. As I have taken the larva at Yoshino, Yamato, in May, the young larvæ possibly hibernate.

Local distribution.—Honshu. Koya-san, Kishu Province, August, September; Yoshino, Yamato Province, June; Kobe, Settsu Province, October to December. Hokkaido (Yezo). Hakodate, Oshima Province, September.

Cocoon.—The larva spins a loosely webbed cocoon among the leaves of the food plant.

Matsumura [21] states that the imago causes injury to such fruits as pears, peaches, etc., by sucking their juices. The following references to this habit alluded to in the Zoological Record and elsewhere are of much interest:[22]

> The proboscis of *Ophideres* is modified into a strong, rigid, boring instrument, armed with spines, with which the insect pierces the skin of oranges and sucks the juice. [The proboscis of *O. fullonica* L. is figured.]
>
> *Ophideres fullonica* and its allies do not perforate oranges, etc., but enlarge the hole previously made by some other insect and suck the juice through that.[23]

The structure of the proboscis of *O. fullonica* is also described, with figures, by F. Darwin.[24]

ZYGÆNIDÆ

CHACOSIINÆ

Genus **ELCYSMA** Butler

Elcysma Butler, Trans. Ent. Soc. Lond. (1881), 4.

Elcysma westwoodii Vollenhoven.

Plate III, fig. 4, larva; fig. 5, pupa, dorsal aspect; fig. 6, pupa, abdominal aspect; fig. 7, apex of cocoon; fig. 8, cocoon, lateral aspect; fig. 9, cocoon, upper aspect; fig. 10, food plant.

Japanese name, *usuba-tsubamega.*

Agalope westwoodii Voll., Tidjschr. Voor. Ent. (1863), **6**, 136, Pl. 9, fig. 3.

Elcysma westwoodii Elwes, Proc. Zool. Soc. Lond. (1890), 386, Pl. 34,

[21] Thousand Insects of Japan (Nihon Senchū Dzukai) (1910), suppl. 2, 1.

[22] *Zool. Rec.* (1875), **12**, 441; see also J. Kunckel, *Compt. rend. Acad. sci.* (1875), **81**, 387–400. Translation in *Ann. & Mag. Nat. Hist.* (1875), IV, **16**, 372–374, and *Bull Soc. Ent. Fr.* (1875), **5**, 212.

[23] *Zool. Rec.* (1877), **14**, 167; see also Pilcher, *Cis. Ent.* (1875), **2**, 237–240.

[24] *Zool. Rec.* (1875), **12**, 441; see also F. Darwin, *Quart. Journ. Micros. Sci.* (1875), n. s. **15**, 384–389, and *Month. Micros. Journ.* (1875), **19**, 235–236.

fig. 5; STGR. and REB., Cat. Lep., Pal. (1901), 1, 392, No. 4428; LEECH, Trans. Ent. Soc. Lond. (1898), 349, No. 261; MATSUMURA, Cat. Insect. Jap. (1905), 1, 183, No. 1529; NAGANO, Nawa's Insect World [Konchū Sekai (Jap.)] (1907), 11, 489, Pl. 13, larva, pupa, imago, ♂ ♀, and (1912), 16, 512; MATSUMURA, Thousand Insects of Japan [Nihon Senchū Dzukai (Jap.)] (1911), suppl. 3, 3, Pl. 30, fig. 3, ♀; JORDAN, Macrolep. of the World, Faun. Pal. (1910), 2, 13, Pl. 3a; MIYAKE, Tokyo Zool. Mag. [Tōkyō Dobutsugaku Zasshi (Jap.)] (1907), 19, No. 220, 41; Pl. (unnumbered), fig. 5; SASAKI, Insects Injurious to Fruit Trees [Kwajū Gaichūhen (Jap.)], 194 (larva); MATSUMURA, Classification of Insects [Konchū Bunruigaku (Jap.)], pt. 1, 233.

Elcysma translucida BUTL., Trans. Ent. Soc. Lond. (1881), 4; PRYER, Trans. Asiat. Soc. Japan (1883), 43, No. 82; LEECH, Proc. Zool. Soc. Lond. (1888), 612, No. 155.

Elcysma caudata BREM., Lep. Ost.-Sib. (1864), 97, Pl. 8, fig. 8; ELWES, Proc. Zool. Soc. Lond. (1890), 387, Pl. 34, fig. 6; STGR., Rom. Mém. Lép. (1892), 6, 248; STGR. and REB., Cat. Lep. Pal. (1901), 1, 392, No. 4428a; JORDAN, Macrolep. of the World, Faun. Pal. (1910), 2, 13, Pl. 3a; SASAKI, Insects Injurious to Fruit Trees [Kwajū Gaichūhen (Jap.)], 5th ed. (1911), 194, Pl. 60b, larva, imago, ♂.

The larva figured (Plate III, fig. 4) was taken in May, 1901 (figured May 21), at Yoshino, Yamato Province, Honshu, on *sumomo* (*Prunus communis* Huds.), a species of plum tree. I have bred the imago on several occasions from larvæ taken at Yoshino, and I have never found them elsewhere. I have found the larva living in a gregarious state on sumomo and another tree which my Japanese collector named *me-ga-hadzusa*. This, I presume, is a local name, as I am unable to find it in Matsumura's Catalogue of Japanese trees and plants.

The first time that I found the larvæ of *Elcysma westwoodii* was on June 23, 1895, at Imoseyama, Yoshino. They were feeding on a me-ga-hadzusa, a tall tree with rank-smelling white flowers. The branches of this tree had been almost entirely denuded of foliage. However, there were very few larvæ left, as they had evidently all pupated, but I found under the tree a number of their curious boat-shaped cocoons fixed to the leaves of dwarf camellias and oak bushes. The second time I went to Yoshino was on June 11, earlier in the year by twelve days, and judging from my experience of 1895, I hoped to find the larva in greater abundance, but I was disappointed, as there were very few to be found. In 1901 I paid another visit to Yoshino about May 15 and succeeded in finding them in great numbers feeding on sumomo.

Nagano writes at length on the metamorphoses of *E. westwoodii* and gives the following details:

The flight of the imago is sluggish and it is easy to capture. The

larva, which in Gifu, province Mino, Honshū, feeds on Momo (Peach) and Sakura (Cherry), first appears there in May and June. In June and July it is full-grown and spins its cocoon. The imago appears from the end of September to the middle of October.

This agrees with my experience, as on June 11 and 23 there were very few larvæ to be found at Yoshino, but many cocoons, whereas on May 15 I found the larvæ in profusion. One larva which I bred pupated as late as August 15.

I have never myself seen the imago flying, but my Japanese collector captured many specimens at Yoshino in August and September and some in Kyushu in October.

Sasaki states that the imago appears at the end of July, but Nagano has never seen it flying at Gifu in this month, as it does not appear there before September. The examples of this species in the Nawa collection at Gifu, numbering over one hundred specimens, were all taken there between the end of September and the middle of October.

Nagano states that he bred young larvæ from a batch of eggs laid the middle of October. These eggs were placed in a moderately warm greenhouse and hatched at the end of October. He questions whether this would occur in a state of nature, as the rapid incubation may have been due to the unusual warmth. If it is their usual habit to hatch at that time of the year, they would suffer from scarcity of food and, therefore, probably would hibernate in the larval state. If these eggs were forced by the heat of the greenhouse and it were unnatural for them to hatch at that time, they would probably hibernate in the egg stage.

Larva.—The following is a description of the larva taken from one found on May 15, 1901: Length, 29 millimeters. Light greenish yellow; head retractile, almost hidden by deep skin fold of second segment, black, smooth, shiny, a black spot on each side of mandibles; two black submedian spots near dorsal margin of segment 2, and one black spot on each side of same segment; from segment 3 to the anus there extend five violet-brown longitudinal stripes: one mediodorsal, two midlateral, and two spiracular. Spiracles black; the dorsal region has minute, paired black bristles on each segment situated on each side of the mediodorsal line and also a minute bristle issuing from ventrad of the midlateral stripe on each segment. Ventrad to the spiracles and the spiracular stripe there is on each segment, from 3 to anus, a single, slender, long black bristle, feathered somewhat like the antenna of a *Procris*, those on the anterior and posterior segments being rather longer. On the dorsum of segment 2 there are also paired black bristles, one on each side of the black spot;

also two bristles on each side of the anus, altogether twenty-six bristles; the mediodorsal stripe is dilated somewhat into a small diamond pattern; segmental sutures strongly marked; ventrum, legs, and prolegs yellowish white. The caterpillar is sluggish in movement and drops from the leaf by a silken thread when disturbed.

Pupa.—The larva seems to spin its cocoon on the upper surfaces of such leaves as camellias or oak bushes. The cocoon is somewhat boat-shaped and is placed with the flat surface (Plate III, fig. 9) resting on, and parallel with, the midrib of the leaf, the sides of which are drawn together and give support to the sides of the cocoon which adhere to the drawn-in leaf. Therefore, only the curved keellike dorsum (Plate III, fig. 8) of the cocoon is exposed to view, while the rest is concealed by the leaf. The cocoon is dirty white and is parchmentlike in texture, being moderately tough. The pupa is ringed and streaked with golden brown, dorsally of a yellowish golden tinge, and wing cases golden brown.

Staudinger's description of the larva and cocoon of *E. caudata* Brem. agrees very closely with my description of those of *E. westwoodii,* and this seems to prove that *caudata* is merely a local form of *westwoodii* as mentioned by Jordan. Staudinger also states that the larva and cocoon of *caudata* have a certain resemblance to those of *Aglaope infausta* (sic = ? *Agalope*).

Imago.—I have noticed in *Elcysma westwoodii* that the tails of the hind wings of the female are often shorter than those of the male and that the forewings of the female are not so heavily powdered with fuscous scales at the apex as in the male. My Japanese collector informed me that this insect is very local and only flies in the early morning, seldom afterwards. It seems to be abundant locally, my collector having taken over a hundred specimens. Pryer remarks:

> this flies by day and the first one I saw flying I took to be a new *Parnassius,* it has long curled tails and is a very peculiar insect.

The type of *Agalope westwoodii* was described by Vollenhoven from a male captured in Japan by Doctor Siebold, not "from a female found at Port May, Japan, August 15," as stated by Staudinger.[25]

Local distribution.—Honshu. Yoshino, Imoseyama, Yomato Province, August, September (*Wileman, Pryer*); Gifu, Mino Province, September, October (*Nagano, Pryer*). Kyushu.

[25] *Rom. Mém. Lép.* (1892), **6**, 248.

Hiko-san, Busen Province, and Nanaori, Hyūga Province, October.

My Japanese collector informed me that *E. westwoodii* occurs in Hokkaido (Yezo) at Ishigori, Sapporo. Jonas also took it at Osaka, Honshu. Matsumura, however, does not record it from Hokkaido but only from Honshu. Considering the proximity of eastern Siberia to Hokkaido, there seems no reason why *caudata* should not be taken in Hokkaido.

Time of appearance.—Larva, May, June; pupa, June, July, August; imago, August, September, October. Only one brood. Local, but plentiful where found.

General distribution.—Elcysma westwoodii: Korea, eastern Siberia (southern Amurland), Japan, and Burma (*Seitz*). *Elcysma caudata:* Eastern Siberia (Askold, Ussuri). It should also occur in Hokkaido.

ILLUSTRATIONS

[Drawings by Hisashi Kaidō.]

Plate I

Figs. 1 to 4. *Theophila falcigera* Butler.
1, young larva; *2*, food plant; *3*, adult larva; *4*, head and thoracic segments.
5 to 6. *Euchloris difficta* Walker.
5, larva, lateral aspect; *6*, larva, dorsal aspect.
7 to 9. *Megalochlora valida* Felder and Rogenhofer.
7, larva; *8*, food plant; *9*, head.

Plate II

Figs. 1 to 4. *Auaxa sulphurea* Butler.
1, larva; *2*, food plant; *3* and *4*, larva, previous to pupation.
5 to 6. *Theophila mandarina* Moore.
5, larva; *6*, food plant.
7 to 8. *Metopta rectifasciata* Ménétries.
7, larva; *8*, food plant.

Plate III

Figs. 1 to 3. *Ophideres tyrannus* Guénée.
1, larva, dorsal aspect; *2*, food plant; *3*, larva, lateral aspect.
4 to 10. *Elcysma westwoodii* Vollenhoven.
4, larva; *5*, pupa, dorsal aspect; *6*, pupa, abdominal aspect; *7*, apex of cocoon; *8*, cocoon, lateral aspect; *9*, cocoon, upper aspect; *10*, food plant.

PLATE I. THEOPHILA FALCIGERA BUTLER, EUCHLORIS DIFFICTA WALKER, AND MEGALOCHLORA VALIDA FELDER AND ROGENHOFER.

PLATE II. AUAXA SULPHUREA BUTLER, THEOPHILA MANDARINA MOORE, AND METOPTA RECTIFASCIATA MÉNÉTRIES.

PLATE III. OPHIDERES TYRANNUS GUENÉE AND ELCYSMA WESTWOODII VOLLENHOVEN.

REVIEW OF THE PHILIPPINE MEMBRACIDÆ

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TWO PLATES AND 3 TEXT FIGURES

INTRODUCTION

The following study has been made with the view of bringing up-to-date the knowledge of those forms of the family Membracidæ known to occur in the Philippine Islands. This group of homopterous insects, so remarkable for the unusual and peculiar development of the pronotum, is well represented in the fauna of the Islands and, indeed, from this region have emanated some of the most bizarre of the species.

The extensive and careful collecting of Professor C. F. Baker, of Los Baños, has made it possible to recognize practically all of the species hitherto described, as well as a few forms which are apparently new. These are here reviewed and classified with the hope that they may be made more easily recognizable. The synoptic tables given are admittedly artificial, but it is believed that these keys, based on easily determined structures, even though perhaps unnatural, will make it possible for the student to recognize all of the species known to the Islands at the present time.

This paper is in no sense monographic and is intended merely as a preliminary contribution toward a more thorough study of the local forms of the family. A brief discussion of each species is given in cases in which the species has been recognized, and a summary is given of the original description of those species which have not been taken in recent years.

I am greatly indebted to Professor Baker, who has very kindly sent me practically all of the material on which this study is based and whose excellent collecting has made the work possible.

SUBFAMILIES OF THE MEMBRACIDÆ

Six subfamilies are recognized in the Membracidæ, and these may be separated as follows:

Key to the subfamilies.

a^1. Scutellum wanting or entirely concealed by the pronotum.

b^1. Tarsi of equal length or the posterior pair longest.

c^1. Anterior tibiæ foliaceous ..... **Membracinæ.**

c^2. Anterior tibiæ simple.

d^1. Apical cell of tegmen not petiolate ..... Darninæ.
d^2. Apical cell of tegmen petiolate, the adjacent cells touching before it.
e^1. Tegmina opaque, veins not distinguishable..... Tragopinæ.
e^2. Tegmina membranous, veins distinct..... Smiliinæ.
b^2. Posterior tarsi very short, much shorter than anterior or intermediate ..... Hoplophorinæ.
a^2. Scutellum present and usually, but not always, uncovered..... Centrotinæ.

DISTRIBUTION AND CHARACTERS OF THE CENTROTINÆ

It is interesting to note that only one of these subfamilies—the Centrotinæ—is represented in the species thus far taken in the Islands.[1] This subfamily is the dominent subfamily in the East Indies and the Orient, but other subfamilies are found in India and in Australia and may appear in the Philippine fauna, in which case the above table will be available.

The presence of the scutellum, which is the subfamily character, can sometimes be determined only by dissection, but in most cases this structure is plainly visible at the sides or just beneath the posterior process of the pronotum. In all cases the pronotum is greatly developed, completely covering the mesonotum and the metanotum in the adult insect. The anterior pronotum is often produced in horns and spines, the function of which is conjectural.

HISTORICAL AND BIBLIOGRAPHICAL

Most of the species found in the Islands were described by Walker, Stål, Buckton, and Distant. Walker's descriptions are most unsatisfactory, and some of his species will, perhaps, be located only by reference to type material. Stål's work is so excellent as to need no comment; his genera and species are evidently the result of careful study and should be recognized if found. Buckton's contribution to the Philippine faunal literature is negligible, but his species must remain in the synonymy until they can be definitely located. Distant's descriptions are uniformly excellent and his figures good, but his types are from British India, and his species cannot perhaps be placed with absolute certainty from Philippine material, although it seems that one or two are identical.

In the bibliography which is given for each species it has been necessary greatly to abbreviate the titles and references, which

[1] Buckton has described two species of the subfamily Membracinæ as noted later in the text, but it seems inadvisable to recognize them here from the evidence at hand.

in some cases are of considerable length. To supplement this, a complete bibliography of all of the references cited is given at the end of the paper.

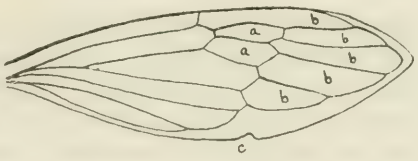

FIG. 1. Fore and hind wings of *Tricentrus fairmairei* Stål. *a*, discoidal cells; *b*, apical cells; *c*, internal angle.

NOMENCLATURE

Some of the terms mentioned in the following descriptions and a few of the characters used in the generic and specific diagnoses are more or less peculiar to the family and should perhaps be briefly explained. The term tegmina is used throughout for the forewings, following Stål, Fowler, Goding, Van Duzee, and other authors. In this wing the discoidal areas (the inclosed cells in the center of the wing) and the terminal or apical areas (the cells reaching the apical margin) are frequently used, but are not entirely reliable characters (fig. 1, *a* and *b*.) The clavus is the narrow posterior portion at the base of the tegmen which is next to the scutellum when the wing is closed. The internal angle of the tegmen is the angle made by the union of the clavus with the corium at the internal margin, usually about two thirds of the distance from the base to the tip (fig. 1, *c*). The terminal areas of the hind wings have proved valuable taxonomic characters, but unfortunately are hard to determine in dried specimens without relaxation. If the specimen is fresh, however, no difficulty is experienced in the use of this character, and even in dried specimens the tegmen may usually be lifted far enough to expose the tip of the underwing without damage to the insect. The sides of the pronotum above the eyes are usually swollen or produced into humeral angles

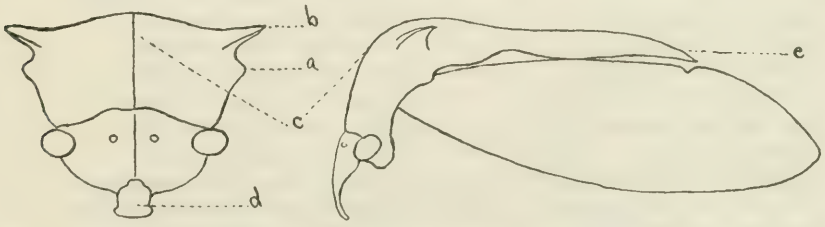

FIG. 2. Front and lateral outline of *Tricentrus fairmairei* Stål. *a*, humeral angles; *b*, suprahumeral horns; *c*, metopidium; *d*, clypeus; *e*, posterior process.

(fig. 2, *a*). Above these angles arise the suprahumeral horns (fig. 2, *b*). The front of the pronotum between the suprahu-

meral horns has been termed the metopidium (fig. 2, *c*).[2] Along the median dorsal line of the pronotum is often a distinct ridge, the dorsal carina, which is generally present on the posterior process, if not percurrent. The posterior extension of the pronotum, which often reaches beyond the tip of the abdomen and sometimes beyond the apex of the tegmen, is known as the posterior process (fig. 2, *e*). The relative position of the ocelli and the eyes is a character which is of value for specific, if not for generic, diagnosis. The clypeus (fig. 2, *d*) in the Membracidæ is the sclerite just below the median line of the vertex and is usually distinct; the labrum below it is much reduced and generally flattened against the body, so that it is not visible from a front view, thus giving the clypeus a labial appearance. The posterior trochanters in some genera show a curious row of teeth along their internal margin (fig. 3). This character is often somewhat difficult to verify, but is most valuable. The tibiæ of the forelegs are occasionally flattened or foliaceous (always so in the subfamily Membracinæ), and usually spined. The presence of punctures and pubescence is used in specific descriptions.

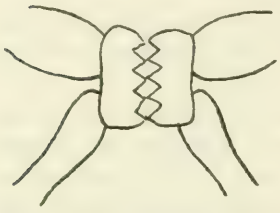

FIG. 3 Armed posterior trochanters.

LIST OF SPECIES

The following check list includes all of the species of the subfamily Centrotinæ described from the Islands to date:

Centrochares horrificus Westw.
Pyrgonota bifoliata Westw.
Pyrgonota tumida Stål.
Pyrgonota philippina Stål.
Pyrgonota bifurca Stål.
Pyrgonota semperi Stål.
Pyrgonota pinguiturris sp. nov.
Leptobelus dama Germ.
Lobocentrus zonatus Stål.
Dograna falco Buckt.
Leptocentrus taurus Fabr.
Leptocentrus leucaspis Walk.
Leptocentrus reponens Walk.
Leptocentrus aduncus Buckt.
Emphusis bakeri sp. nov.
Sertorius erigens Walk.
Periaman brevifrons sp. nov.
Tricentrus convergens Walk.
Tricentrus fairmairei Stål.
Tricentrus capreolus Walk.
Tricentrus pilinervosus Funkh.
Tricentrus plicatus sp. nov.
Tricentrus attenuatus sp. nov.
Centrotus magellani Fairm.
Centrotus dilatatus Walk.
Centrotus torcus Buckt.
Sipylus crassulus Stål.
Sipylus nodipennis Funkh.
Centrotoscelus typus Funkh.
Ebhul carinatus sp. nov.
Gargara luconica Fairm.
Gargara pygmaea Walk.
Gargara patruelis Stål.
Gargara varicolor Stål.

[2] Cf. Van Duzee, E. P., Studies in North American Membracidæ. *Bull. Buffalo Soc. Nat. Sci.* (1908), **9**, 30.

Gargara pulchripennis Stål.
Gargara nigrofasciata Stål.
Gargara tuberculata Funkh.
Gargara luteipennis Funkh.
Gargara nitidipennis Funkh.
Gargara nigrocarinata Funkh.
Gargara brunnea Funkh.
Gargara trifoliata Funkh.
Cryptaspidia pubera Stål.
Cryptaspidia tagalica Stål.
Cryptaspidia impressa Stål.
Cryptaspidia obtusiceps Stål.

Key to the genera of the Centrotinæ.

a^1. Tibiæ more or less foliaceous; sides of thorax armed with two teeth.
  b^1. Two suprahumeral horns; posterior process bilobed..... Centrochares.
  b^2. Single dorsal horn, often bilobed at tip; posterior process simple. Pyrgonota.
a^2. Tibiæ simple; sides of thorax unarmed.
  b^1. Hindwings with four apical areas.
    c^1. Pronotum highly discally elevated; suprahumeral horns absent.
      d^1. Posterior process simple and gradually acute..... Leptobelus.
      d^2. Posterior process lobate..... Lobocentrus.
    c^2. Pronotum not highly discally elevated; suprahumeral horns present.
      d^1. Posterior pronotal process connected with scutellum by a perpendicular prolongation ..... Dograna.
      d^2. Posterior pronotal process without prolongation below.
        e^1. Posterior process distant from scutellum..... Leptocentrus.
        e^2. Posterior process touching scutellum or very close to it.
          f^1. Pronotum high and gibbous before base of posterior process.
            g^1. Suprahumeral horns in a continuous line with the anterior margin of pronotum..... Emphusis.
            g^2. Suprahumeral horns diverging from line of anterior margin of pronotum..... Sertorius.
          f^2. Pronotum not raised above base of posterior process, but in a continuous line with it..... Periaman.
  b^2. Hindwings with three apical areas.
    c^1. Suprahumeral horns present.
      d^1. Hind trochanters armed with teeth..... Tricentrus.
      d^2. Hind trochanters unarmed..... Centrotus.
    c^2. Suprahumeral horns absent.
      d^1. Hind trochanters armed with teeth.
        e^1. Body about as wide as long; lateral angles prominent... Sipylus.
        e^2. Body much longer than wide; lateral angles not prominent. Centrotoscelus.
      d^2. Hind trochanters not armed.
        e^1. Posterior process strongly sinuate..... Ebhul.
        e^2. Posterior process not strongly sinuate.
          f^1. Body robust; size small..... Gargara.
          f^2. Body slender; size larger..... Cryptaspidia.

Genus CENTROCHARES Stål

Centrotus Fabr. (in part); *Oxyrhachis* Germ. (in part); *Pterygia* DeLap. (in part); *Notocera* A and S. (in part).

The genus *Centrochares* was erected by Stål in 1866,[3] but no species was mentioned as belonging to the genus. The generic

[3] Hemiptera Africana (1866), 4, 86.

characters may, however, be deduced from the table given to be as follows: Bilobed posterior process, foliaceous tibiæ, sides of thorax armed with spines, horns present above lateral angles. Later in the same year [4] Stål designates as the type of the genus Westwood's old species (*Centrotus*) *horrificus*, which Walker had incorrectly placed in DeLaporte's genus *Pterygia* of the subfamily Membracinæ.[5] In the Hemiptera Philippinarum [6] this species is given as the only species in the genus. The genus has remained monotypic.

The single species of the genus bears a strong superficial resemblance to the forms of the genus *Pterygia*, but may immediately be distinguished by the well-developed and plainly visible scutellum, which places it at once in another subfamily. The genus may be characterized not only by the foliaceous tibiæ and toothed thorax as described by Stål, but also by the most remarkable development of curious spines and tubercles over the surface of the pronotum. These bristling spines are of various shapes, lengths, and colors and give to the insect a decidedly terrifying aspect.

Centrochares horrificus Westw. Plate I, fig. 1.

Centrotus horrificus WESTW., Proc. Zool. Soc. (1837), 130; GUÉR., Mag. Zool. (1841), II, 3, Pl. 82; LEFEBVRE, Bull. Ann. Soc. Fr. (1842), 21.
Pterygia horrificus WALK., List Hom. Brit. Mus. (1851), 500; (1852), 4, Tab. 4, figs. 4 and 5.
Centrochares horrificus STÅL, Analect. Hem. (1866), 386; STÅL, Hem. Phil. (1870), 731; BUCKT., Mon. Memb. (1903), 266; FUNKH., Journ. Ent. & Zool. (1914), 6, 69.
Pterygia horrifica BUCKT., Mon. Memb. (1903), 73, Pl. XII, fig. 5.
Pterygia postica BUCKT., Mon. Memb. (1903), 70, Pl. XI, figs. 4–5a.
Pterygia spinula BUCKT., Mon. Memb. (1903), 73, Pl. XII, fig. 4.

Centrochares horrificus is readily distinguished from all other membracids thus far described from the Islands on account of the peculiar bristling spines, which are not found on any other species. The insects vary considerably in size and color. The males are usually smaller and darker than the females.

I believe Buckton's two Philippine species, *Pterygia postica* [7] and *Pterygia spinula*,[8] are both *Centrochares horrificus*. It seems incredible that the subfamily Membracinæ should be represented in the Islands by these two species only, and it is

[4] *Ber. ent. Zeitschr.* (1866), 10, 386.
[5] Cat. Hom. Brit. Mus. (1851), pt. II, 500.
[6] Stål, *Oefver. Kongl. Vet. Akad. Forh.* (1870), 731.
[7] Mon. Memb. (1903), 70.
[8] Ibid., 73.

more than likely that Buckton followed Walker's error in assigning his insects to the wrong genus. I have specimens of *C. horrificus* which conform to Buckton's descriptions and figures for his supposed new species.

Centrochares horrificus, once examined, will not be readily confused with other species, and the following brief description will, I believe, suffice to assure its recognition:

Female.—Ferruginous with yellowish spines. Suprahumeral horns long, spreading, flattened, much swollen at tips. Pronotum with sudden elevation just above scutellum. Posterior process reaching extremities of tegmina with high, swollen, bilobed elevation before the tip.

Head long, subfoliaceous, dark ferruginous, finely punctate, very slightly pubescent, median line smooth; clypeus twice as long as wide, obovate, bearing on each side two yellow tubercles; eyes large, translucent white with brownish fascia, bordered internally with a row of four or five whitish yellow tubercles; ocelli elevated, transparent, nearer to the eyes than to each other, situated above a line passing through center of eyes, bordered internally with three or four white tubercles. Pronotum ferruginous mottled with black; deeply punctate, sparingly pubescent, covered with irregular whitish yellow spines; humeral angles prominent; suprahumeral horns long, high, spreading, flattened, tips swollen, more or less triquetrous, marked with irregular flattened areas, tubercular; median ridge sharp, distinct, percurrent, closely tubercled; metopidium rounded; median region above scutellum in a rounded elevation; posterior elevation twice as high as median, bilobed, rough, marked in flattened areas; tip of posterior process blunt. Scutellum distinct, strongly bifid. Tegmina opaque, sordid ferruginous marked with black; base somewhat punctate; tip dark. Underside of body dark brown. Sides of meta- and mesothorax bearing teeth.

Legs light brown; tibiæ much flattened, tuberculate; tarsi yellow-brown.

Length, 5 to 6 mm.; width between extremities of pronotal horns, 4 to 5 mm.; width between bases of pronotal horns, 0.5 to 1 mm.

Male.—Dull black with yellowish spines. Tegmina brown-black, light transparent area just below posterior elevation of pronotum. Body very rough, punctured. Underparts of body, base of legs, and femora black; tibiæ and tarsi light brown.

Length, 3.5 to 5 mm.; width between extremities of pronotal horns, 2 to 3.5 mm.; width between bases of pronotal horns, 0.4 to 0.9 mm.

Philippine Islands (Westwood, Walker, Stål, Buckton); LUZON, Los Baños, Mount Banahao (*Baker*).

Genus PYRGONOTA Stål

Centrotus FABR. (in part); *Smilia* GERM. (in part); *Hypsauchenia* GERM. (in part).

Pyrgonota, according to its author, is to be separated from the old genus *Hypsauchenia* of Germar chiefly by the lack of a dorsal lobe on the posterior process. Schmidt [9] does not recognize this as a generic distinction, and it is indeed doubtful whether the genus will stand as new species are added. For the present, however, since the Philippine forms may be thus arbitrarily grouped, it seems desirable to accept the genus tentatively for the sake of convenience.

Stål designates no type species, but the logical choice falls on *P. bifoliata* Westw., both on account of its abundance—all of the other species are apparently rare—and because it has long been known and figured in literature. All of the species of this genus are native to the Islands.

The following key, adapted from that of Stål, will enable the student to separate the species:

Key to the species of Pyrgonota.

a^1. Posterior process of thorax without lateral carinæ.
  b^1. Posterior process uniformly colored.
    c^1. Posterior process depressed and gradually slender behind middle.
      d^1. Anterior process ridged; tegmina with pale spot..... **tumida.**
      d^2. Anterior process not ridged; tegmina concolorous.... **pinguiturris.**
    c^2. Posterior process acutely tectiform behind middle..... **philippina.**
  b^2. Posterior process with large pale spot before middle..... **bifoliata.**
a^2. Posterior process of thorax with lateral carinæ.
  b^1. Posterior process gradually acuminate and concolorous..... **bifurca.**
  b^2. Posterior process higher behind than before the middle; marked with a pale spot..... **semperi.**

Pyrgonota bifoliata Westw. Plate I, fig. 2.

Centrotus bifoliatus WESTW., Proc. Zool. Soc. (1837), 130.
Smilia bifoliata WESTW., Guér. Mag. Zool. (1841), II, 3, Pl. 83; LEFEBVRE, Bull. Ann. Soc. Fr. (1842), 21.
Hypsauchenia westwoodi FAIRM., Rev. Memb. (1846), 521, Pl. 7, figs. 6–8; WALK., List Hom. Brit. Mus. (1851), 631; BUCKT., Mon. Memb. (1903), 211, Pl. 46, figs. 6, 6a.
Hypsauchenia bifoliata FAIRM., Rev. Memb. (1846), 521; SCHMIDT, Stett. Ent. Zeitg. (1906), 370.
Hypsauchenia bifasciata WALK., List Hom. Brit. Mus. (1851), 631.
Pyrgonota bifoliata Stål, Hem. Phil. (1870), 731; BUCKT., Mon. Memb. (1903), 270; FUNKH., Journ. Ent. & Zool. (1914), 6, 67.

[9] *Stett. ent. Zeitg.* (1906), 67, 370.

Pyrgonota bifoliata is a most bizarre species, recalling in general outline *Hypsauchenia hardwickii* Kirby, but with the anterior horn straighter and without the posterior elevation. Its frequent mention in literature makes its identification comparatively easy.

Chocolate-brown with broad whitish yellow patch covering middle of posterior process and extremity of this process darker. Pronotum and exterior basal area of tegmen broadly punctured and sparingly pubescent, the punctures separated by reticulated ridges, which form a network of polygonal areas. Pronotal horn very high, gradually narrowing to point of branching; two-branched at extremity, the branches spreading and flattened at tips. Posterior process tectiform. Entire posterior margin of pronotal horn armed with fine spines, these spines extending down over dorsal margin of posterior process and gradating into serrate teeth at extremity. Tegmina brown and opaque, exterior margin wavy; hindwings transparent, veins brown. Tibiæ foliaceous.

Length, head to tip of tegmen, 6 to 7 mm.; height of pronotal horn to point of branching, 5 mm.; length of branches of pronotal horn, 5 mm.

Philippine Islands (Westwood, Fairmaire, Walker, Stål, Buckton); LUZON, Los Baños (*Baker*).

Pyrgonota tumida Stål.

Pyrgonota tumida STÅL, Hem. Phil. (1870), 730; BUCKT., Mon. Memb. (1903), 270.

Black; head and thorax distinctly punctate. Dorsal process high, above the middle gradually becoming slender, strongly thickened at apex, both anterior and posterior margin bearing a single ridge, the sides three-ridged; the posterior carina slightly denticulate, the teeth continuing upon the posterior process. The posterior process gradually slender as seen from a side view, behind the middle subdepressed. Tegmina marked with a small, pale spot before the apex of the clavus. Feet flavo-testaceous.

Length, 8 mm.; width, 2.2 mm.

Described by Stål from the male only.

Philippine Islands (Stål).

Pyrgonota philippina Stål.

Pyrgonota philippina STÅL, Hem. Phil. (1870), 730.

Pitchy black; thorax strongly punctate. Dorsal process high, straight, leaning more or less forward, slightly recurved toward

apex, gradually becoming slender; anterior and posterior unicarinate, the sides with two or three carinæ; apex somewhat thick, truncate, and compressed anterior-posteriorly; carinate, the posterior carina minutely denticulate and extending upon the posterior process. Posterior process acutely tectiform, subcompressed. Tegmina with pale spot before apex of clavus. Hindwings vitreous. Feet flavous-pitchy.

Length, 8 mm.; width, 2.2 mm.

Described by Stål from the female only.

Philippine Islands (Stål).

I am inclined to think that this is the female of *P. tumida*, but am recognizing it tentatively, pending an opportunity to examine more specimens.

Pyrgonota bifurca Stål.

Pyrgonota bifurca STÅL, Hem. Phil. (1870), 731.

Piceous; head slightly punctate, thorax strongly punctate. Dorsal process varying in length, gradually becoming slender and leaning somewhat forward; anterior and posterior margins unicarinate, sides with two carinæ; apex with two slender triquerate processes, strongly diverging and slightly curving, compressed-ampliate in the middle. Posterior carinæ spiny, continuing on the posterior process. Posterior process acutely tectiform, narrow as seen from the side. Feet concolorous.

Length, 7.5 mm.; width, 2 mm.

Philippine Islands (Stål).

Pyrgonota semperi Stål.

Pyrgonota semperi STÅL, Hem. Phil. (1870), 731.

The species noted by Stål as "*C. Semperi*" in his work on the Philippine Hemiptera has never been recognized and is known only through his short description, which follows that of *P. bifurca* and is as follows:

Praecedenti maxime affinis, differt processu postico thoracis ante medium macula pallescente notato, pone medium quam anterius altiore, tegminibusque totis piceis. ♀ Long. 7, lat. 2 mill.

I have included this species in the preceding key, with the specific distinctions as indicated, in the hope that future collecting may lead to its identification.

Pyrgonota pinguiturris sp. nov. Plate I, fig. 3.

Pyrgonota pinguiturris is apparently near *P. tumida* Stål, but differs in being without carinæ on its pronotum and lacking the spot on the tegmina.

Ferruginous; rough; densely, coarsely, and deeply punctate; sparingly pubescent. Dorsal horn thick and heavy, uniformly cylindrical, somewhat swollen at apex with the suggestion of lateral processes at the tip. Posterior process gradually acuminate, slightly depressed at tip, extending just beyond extremity of abdomen. Tegmina uniformly opaque ferruginous; pointed at tips. Tibiæ broadly foliaceous.

Head subtriangular, longer than broad, finely and densely punctate, finely pubescent; eyes large, brown, extending halfway to lateral angles of pronotum; ocelli small, translucent, farther from each other than from the eyes and situated above a line passing through center of eyes; clypeus broader than long, trilobed, middle lobe longest, pubescent at tip. Pronotum uniform brown, very rough, coarsely punctate, very sparsely pubescent; dorsal horn cylindrical, of almost uniform thickness, inclining strongly forward, without anterior, posterior, or lateral carinæ, tip swollen and rounded above, on either side of tip a very slight lateral protuberance; lateral angles not prominent; scutellum distinct, bifurcate; posterior process slender, gradually acuminate, triquetrous, the roughly defined dorsal ridge giving it a tectiform appearance, extending just beyond the internal angles of tegmina. Tegmina opaque, strongly punctate over entire basal and costal areas, veins indistinct, tip pointed. Undersurface of body chocolate-brown; legs and feet ferruginous; tibiæ swollen and foliaceous. Type, female.

Length, head to tip of tegmina, 6.5 mm.; length of pronotal horn, 4 mm.; width between humeral angles, 2 mm.

LUZON, Mount Maquiling (*Baker*).

Genus **LEPTOBELUS** Stål

Centrotus FABR. (in part).

Leptobelus was erected by Stål in 1866 [10] for the reception of those species of the subfamily Centrotinæ in which the tibiæ were simple, sides of breast unarmed, hindwings with four apical areas, exterior discoidal area of tegmina petiolate, and disk of thorax elevated, bearing posterior process high above the body.

In this genus the prothorax rises in a high column, which gives off at its summit two lateral horns and the posterior process, the latter being distinctly raised above the abdomen and usually subparallel to it. The scutellum is longer than broad, with the tip more or less truncate. Only one species of the genus has been reported from the Islands.

[10] Hem. Afr. (1866), 4, 86.

Leptobelus dama Germ. Plate I, fig. 4.

Centrotus dama GERM., Rev. Silb. (1835), 258, Pl. 3, fig. 14; FAIRM., Rev. Memb. (1846), 510; WALK., List Hom. Brit. Mus. (1851), 602.
Leptobelus dama STÅL, Berl. Ent. Zeitschr. (1866), 386; STÅL, Bid. Memb. Kan. (1869), 284; ATKINS., Journ. Asiat. Soc. Beng. (1885), 54, 81; DIST., Fauna Brit. Ind.—Rhynch. (1907), 4, 15, fig. 11; LEFROY, Ind. Ins. Life (1909), 729, fig. 504; BANKS, Phil. Journ. Sci., Sec. D (1910), 5, 47.

Leptobelus dama is apparently common throughout India and the East Indies. Professor Baker has sent me specimens from Palawan, and Banks has also reported it from the Islands. The species has been so often described and figured that further description is unnecessary, except for convenience in comparison should other species of the genus be found.

Shining black; densely punctate; base of scutellum and sides of breast gray pilose; tegmina translucent bronze with prominent brown veins; hind tibiæ very spiny. Lateral branches of pronotal horn long, sharp, slightly curving backward. Posterior process rising high above scutellum and gradually curving downward until it almost touches tegmina midway between internal angle and tip; this process sharply carinate above.

India (Fairmaire, Stål, Lefroy); East Indies (Walker); Java (Distant); PALAWAN, Puerto Princesa (*Baker*).

Genus **LOBOCENTRUS** Stål

The genus *Lobocentrus* was erected [11] for the species *zonatus* described by Stål from the Philippine Islands in 1870. Neither the genus nor the species has since been mentioned in literature, with the exception of a catalogue reference by Buckton as listed below. The genus is, however, well described and clearly defined, and its validity has never been questioned. It is apparently close to *Leptobelus* and is to be distinguished from that genus, according to the author, by the difference in position of ocelli, the lobe of the posterior process, and the number of discoidal areas in the tegmina.

Lobocentrus zonatus Stål.

Lobocentrus zonatus STÅL, Hem. Phil. (1870), 728; BUCKT., Mon. Memb. (1903), 268.

The following brief summary of the specific characters as listed by Stål may aid the student in recognizing *Lobocentrus zonatus*.

Black; distinctly punctate; head, thorax, and scutellum sparsely sericeous with golden-flavous pubescence, the sides of

[11] Hem. Phil. (1870), 727.

the breast very densely sericeous in the same manner. Tegmina obscure wine-colored, a translucent fascia before the middle and the veins fuscous; base black and punctate. Prothorax with percurrent median ridge; lateral horns extending outward and slightly curving backward, slender, gradually acuminate, bisulcate above; posterior process lobed, acutely tectiform.

Described from the female.

Length, 8 mm.; width, 3.5 mm.

Philippine Islands (Stål).

I have never seen a specimen of this species and have not been able to learn whether or not the type is available for study. It would seem, however, that the species should be recognized if found.

Genus **DOGRANA** Distant

Campylocentrus STÅL (in part).

Dograna is a very distinct genus, including those species in which the posterior process is united with the apex of the scutellum by a strong downward perpendicular prolongation. The suprahumeral horns are prominent; scutellum distinct and slightly longer than broad; posterior process curved. While the generic characters are more or less artificial, they are convenient in studying this rather confusing group of the Membracidæ. The genus was erected by Distant in 1907 [12] and placed by him in his division *Acanthophyesaria*. The genus contains at present but two species, one of which is native to the Philippines.

Dograna falco Buckt.

Campylocentrus falco BUCKT., Mon. Memb. (1903), 243, Pl. 56, figs. 2, 2a.

Dograna falco DIST., Fauna Brit. Ind.—Rhynch. (1907), 4, 24.

Apparently rare. I have seen one specimen bearing the locality label "Malinao." This specimen may be described as follows:

Very dark brown, almost black; thickly and roughly punctured; pilose with scattered golden hairs, particularly on scutellum and sides of mesothorax. Suprahumeral horns subtriquetrous, extending almost directly outward, very slightly upward and backward. Posterior process extending beyond internal angle of tegmina, connected to scutellum by downward prolongation; dorsal carinæ high and sharp; tip gradually acuminate. Tegmina vitreous, wrinkled, black and punctate at base. Undersurface of body and legs very dark brown; femora swollen; tibiæ finely spined; tarsi ferruginous. Female.

[12] Fauna of British India—Rhynchota (1907), 4, 24.

Length, 9 mm.; width between extremities of pronotal horns, 5.8 mm.

I believe this to be Buckton's species, though it is slightly larger than the specimen he describes. The habitat given by that author is Luzon, Philippine Islands. There was no date label nor further locality name on the specimen which I was permitted to examine.

Genus LEPTOCENTRUS Stål

Membracis FABR. (in part); *Centrotus* FABR. (in part).

Leptocentrus is an old and well-established genus,[13] including those forms in which the posterior process is well elevated above the body but does not bear a lobe below. The hind wings have four apical areas and the tegmina five apical and two discoidal. The suprahumeral horns are strong and usually widespreading. The genus is well represented in Africa and India; four species have been reported from the Philippines. These may be separated as follows:

Key to the species of Leptocentrus.

a^1. Posterior process short, not extending as far as the internal angle of tegmina ..... aduncus.

a^2. Posterior process extending beyond internal angle of tegmina.

b^1. Suprahumeral horns extending strongly upward..... leucaspis.

b^2. Suprahumeral horns almost horizontal.

c^1. Front margin of suprahumeral horns flattened into subfoliaceous ridge ..... reponens.

c^2. Front margin of suprahumeral horns not flattened..... taurus.

Leptocentrus taurus Fabr.

Cicada taurus LINN., Gmel. Ed. Syst. Nat. (1740), 1, 3; (1767), 4, 14; FABR., Spec. Inc. (1781), 2, 317; FABR., Mant. Ins. (1787), 2, 264.

Membracis taurus FABR., Syst. Ent. (1775), 676; OLIV., Enc. Méth. (1792), 7, 665; FABR., Ent. Syst. (1794), 4, 14.

Membracis rupicapra FABR., Ent. Syst. Suppl. (1798), 514.

Centrotus rupicapra FABR., Syst. Rhyng. (1803), 18.

Centrotus taurus FABR., Syst. Rhyng. (1803), 18; GERM., Rev. Silb. (1835), 3, 257; BLANCH., Hem. (1840), 3, 182; FAIRM., Rev. Memb. (1846), 510; WALK., List Hom. Brit. Mus. (1851), 602; Suppl. (1858), 158.

Membracis tricornis HARDW., Zool. Journ. (1828), 13; HARDW., Tabl. Suppl., Pl. 30, figs. c, d, f.

Centrotus terminalis WALK., List Hom. Brit. Mus. (1851), 604; MELICH., Hom. Cey. (1903), 109.

Centrotus vicarius WALK., List Hom. Brit. Mus. (1851), 605.

[13] Stål, Hem. Afr. (1866), 4, 87 and 90.

Leptocentrotus taurus STÅL, Hem. Afr. (1866), 4, 90; STÅL, Analect. Hem. (1866), 386; STÅL, Hem. Fabr. (1869), 2, 50; ATKINS., Journ. Asiat. Soc. Beng. (1885), 54, 85; GODG., Cat. Memb. N. Am. (1894), 477; BUCKT., Mon. Memb. (1903), 268; MELICH., Hom. Cey. (1903), 116; DIST., Fauna Brit. Ind. (1907), 4, 28; LEFROY, Ind. Ins. Life (1909), 731, 732; BANKS, Phil. Journ. Sci., Sec. D (1910), 5, 48.
Leptocentrus gazella BUCKT., Mon. Memb. (1903), 235, Pl. 53, fig. 5a.

Reported from the Philippine Islands by Banks as above. The large number of easily available references makes a description unnecessary. The species shows some slight variation in size, coloration, and position of pronotal horns when a large series is examined. Distant's figure [14] is typical. I have not seen Philippine material.

Assam, Calcutta (Atkinson); Tenasserim, Mytitta (Doherty); Borneo (Distant); Timor (Buckton); Philippine Islands (Banks); Ceylon (Melichar).

Leptocentrus leucaspis Walk.

Centrotus tauros (in part: error) WALK., List Hom. Brit. Mus. (1851), 602.
Centrotus leucaspis WALK., List Hom. Brit. Mus. Suppl. (1858), 158.
Leptocentrus leucaspis BUCKT., Mon. Memb. (1903), 235, Pl. 53, figs. 3, a, b; MELICH., Wien. Ent. Zeitg. (1905), 24, 294; DIST., Fauna Brit. Ind. (1907), 4, 30, fig. 25.

Black; roughly punctate; scutellum and sides of mesothorax densely pilose. Suprahumeral horns slender, triquetrous, extending upward, outward, and backward, well above dorsal line of pronotum; tips sharp. Posterior process tricarinate, arising well above scutellum and curving downward until it almost touches tegmina just behind internal angles. Tegmina vinaceous; veins somewhat obscure; base opaque and punctate. Legs and undersurface of body fuscous.

Length, 7 to 9 mm.; width between extremities of suprahumeral horns, 5 to 7 mm. The males are smaller and darker than the females.

British India and Philippines (Distant).

Leptocentrus reponens Walk. Plate I, fig. 6, *a* and *b*.

Centrotus reponens WALK., List Hom. Brit. Mus. (1851), 604; MELICH., Hom. Cey. (1903), 110.
Centrotus antilope STÅL, Freg. Eug. Resa, Ins. (1859), 284.
Leptocentrus antilope STÅL, Hem. Phil. (1870), 727.
Leptocentrus reponens ATKINS., Journ. Asiat. Soc. Beng. (1885), 54, 86; DIST., Fauna Brit. Ind. (1907), 4, 30; FUNKH., Journ. Ent. & Zool. (1914), 6, 69.

[14] Fauna of British India—Rhynchota (1907), 4, 28, fig. 24.

Evidently the commonest of the Philippine species of this genus. Walker, Stål, and Distant have all recorded it from the Islands, and Professor Baker has sent me specimens collected at Los Baños.

Black; coarsely and deeply punctate; scutellum and sides of meso- and metathorax densely white tomentose; metopidium and lateral areas of pronotum covered with long yellowish pubescence. Head broader than long, densely pilose, finely punctate; clypeus trilobed, longer than wide; eyes prominent, light brown; ocelli translucent, equidistant from each other and from the eyes, and situated on a line passing through center of eyes. Disk of pronotum thick, heavy, and cylindrical; suprahumeral horns flattened, front margin subfoliaceous, tips suddenly acute; these horns extending outward and backward, almost horizontal, not rising above highest point of posterior process. Posterior process arising from top of posterior region of pronotal disk, gradually sloping downward but not touching tegmina; slender, almost uniform in thickness, triquetrous, tip gradually acuminate. Tegmina hyaline with broad, well-defined brown veins; base very slightly punctate and somewhat pilose. White tomentose metathorax usually showing through base of wings. Undersurface of body, legs, and feet black.

Length, 8 mm.; width between extremities of pronotal horns, 6.5 to 7 mm.

Tenasserim, North Bengal (Walker); Sumatra (Distant); Philippine Islands (Walker, Stål, Distant); LUZON, Los Baños (*Baker*).

Leptocentrus aduncus Buckt.

Leptocentrus aduncus BUCKT., Mon. Memb. (1903), 236, Pl. 53, fig. 6.

This species has not been recorded since Buckton's original description, and it seems doubtful if it can be recognized from his short description and poor figure. It apparently may be distinguished only by the short horns and the short and auriculate posterior process as represented in his plate. Buckton's description follows:

Dark fuscous, shining and punctured. Suprahumerals short and auriculate. Posterior horn stout at base and short. Tegmina fuscous. Frons hairy. Size 6 x 5 mm. Habitat-Luzon, Philippine Isles.

Genus **EMPHUSIS** Buckton

Centrotus FABR. (in part); *Centrotypus* STÅL (in part).

The genus *Emphusis* is peculiar in having been apparently incorrectly diagnosed by its author. Buckton states in his

original description that in *Emphusis* the suprahumeral horns are absent.[15] Distant, however, who presumably had Buckton's type before him, states that the suprahumeral horns are well developed but directed subhorizontally and recurved apically.[16]

The genus is close to *Centrotypus*, but differs in having the anterior part of the pronotum much more elevated and swollen and in having the anterior margin of the suprahumeral horns in a continuous line with the semicircular anterior margin of the metopidium. The hind wings have four apical areas, the tegmina five apical areas. To this genus must be assigned the following very remarkable species:

Emphusis bakeri sp. nov. Plate I, fig. 7, *a* and *b*.

Large, handsome, brilliantly marked. Head and pronotum black, the front of head, sides of metopidium, median dorsal area between pronotal horns, and lateral margin of pronotum as far as posterior process densely covered with snowy white tomentose excrescence. Pronotum rising thick and high with broad, widespreading suprahumeral horns. Dorsal margin of pronotum sloping roundly to posterior process, which is curved, decurrent, and extends to tips of tegmina. Tegmina black and punctate at base and costal margin; hyaline in middle; red bordered with brown at tip. The jet-black abdomen shows through the hyaline portion of the tegmina. Legs and feet fuscous-ferruginous. The marked contrast of the black, white, and red gives the insect a striking appearance. This is the largest membracid thus far reported from the Philippines.

Head longer than broad, black, deeply but not closely punctate; a broad, white, tomentose vertical band extending from base of head to extremity of clypeus and occupying the space between the ocelli the width of the clypeus; lateral margin of head strongly sinuate; eyes large, dark gray mottled with brown; ocelli pearly, much farther from each other than from the eyes and situated above an imaginary line extending through center of eyes; antennæ long and bristlelike; clypeus three-lobed, pilose. Pronotum strongly elevated, the disk appearing cylindrical from a front view, but extended posteriorly to form a subtriangular plate behind; suprahumeral horns arising from top of pronotum, subhorizontal, curving downward and backward to an extent which continues the line of the anterior margin of the pronotum; posterior process long, decurved, gradually acuminate, follow-

[15] Mon. Memb. (1903), 256.

[16] Fauna of British India—Rhynchota (1907), 4, 36.

ing the curve made by the internal margin of the tegmina, sharply carinate above, two short lateral carinæ at base; dorsal carina percurrent from anterior base of pronotal horns to tip of posterior process. Tegmina long, somewhat narrow; black, opaque, deeply and regularly punctate, and sparingly pubescent at base; hyaline in middle; costal area for two thirds the length of the tegmen black and punctate; apical fourth red with smoky brown border; veins distinct, assuming the color of the part of the tegmen traversed. Undersurface of body black; abdomen black with segments bordered with yellow. Legs fuscous-ferruginous; femora somewhat swollen; tibiæ slightly foliaceous and covered with fine spines; tarsi flavous and spined; claws brown. Type, female.

Length, 10.5 mm.; width between extremities of pronotal horns, 8.6 mm.

MINDANAO, Iligan (*Baker*).

The type specimen bears Baker's duplicate No. 3115.

The male is smaller and darker and lacks much of the snowy white pubescence on the front and sides of the pronotum. The brown border on the tips of the tegmina is not so prominent.

Length, 8 mm.; width between tips of horns, 7 mm.

I take pleasure in dedicating this very interesting species to Professor C. F. Baker, through whose kindness I have been permitted to examine most of the species recorded in this study.

Genus SERTORIUS Stål

Centrotus FABR. (in part).

The standing of the genus *Sertorius* may be seriously questioned, but it is here included, pending further knowledge of the group. As diagnosed by Stål, the characters may be stated as follows: Posterior process present; tibiæ simple; underwings with four apical areas; exterior discoidal cell of tegmina never petiolate; posterior process touching scutellum; thorax strongly elevated; horns present above lateral angles; longitudinal ridge of thorax not elevated between lateral horns; lateral horns never compressed anteriorly and posteriorly; tegmina with five complete apical areas; sides of scutellum distinctly prominent; eyes slightly prominent; two interior longitudinal veins of corium joining transverse veins before the middle.[17]

According to this description the genus differs from *Centrotypus* Stål only by the presence of a cross vein at the base of the tegmen, a structure which both Goding [18] and Kirkaldy [19] have remarked as being of very doubtful value as a generic character.

[17] Vide Stål, Hem. Afr. (1866), 4, 87.

Sertorius erigens Walk.

Centrotus erigens WALK., List Hom. Brit. Mus. (1851), 614.
Sertorius erigens STÅL, Hem. Phil. (1870), 727.

Black; head and pronotum roughly punctured. Head narrower than anterior pronotum, wider than long. Pronotum convex, slightly ridged, very deep in front, rising vertically from the head; lateral angles obtuse, not prominent. Suprahumeral horns broad, thick, prismatic, diverging, very slightly inclined backward and downward, as long as the space between them; sides conical, slightly and irregularly ridged, of almost equal breadth. Posterior process deep at base, slender and tapering toward apex, triquetrous, slightly curved, extending beyond tip of abdomen. Abdomen tinged with gray. Tegmina blackish brown along the borders, almost colorless in the middle, three fourths of costal border and base punctate. Hindwings almost colorless.

Length, 10 mm.; width between extremities of outstretched tegmina, 18 mm.

This description is adapted from Walker.

Philippine Islands (Walker, Stål).

Genus **PERIAMAN** Distant

Centrotus FABR. (in part).

A genus with species bearing a superficial resemblance to those of *Centrotus*, but at once distinguished by the four apical areas of the hind wings. Clypeus extending well below the margin of the head; pronotum convex; suprahumeral horns broad and transverse; posterior process equally as high and extending on a line with the dorsal margin of the metopidium, not extending beyond the internal angle of the tegmina. Tegmina broad with five apical areas. Femora and tibiæ simple.

Distant makes *P. flavolineatus* Buckt. the type of this genus.[20]

Periaman brevifrons sp. nov. Plate I, fig. 8, *a* and *b*.

Very dark brown, almost black; densely punctate, sparingly pubescent; pronotum almost vertical above head; dorsal margin continuing horizontally into the posterior process; suprahumeral horns short, thick, and heavy, compressed dorsoventrally, extending outward, very slightly upward and backward; posterior process robust at base, gradually narrowing, sharply carinate

[18] Mon. Aus. Memb. (1903), 27.
[19] *Bull. Haw. Sug. Pl. Assoc.—Hem.* (1907), 3, 90.
[20] Fauna of British India—Rhynchota (1907), 4, 37.

above; tegmina smoky hyaline, tips fuscous, extreme base black and punctate; legs ferruginous.

Head twice as broad as long, somewhat rugose, pubescent with golden hairs; eyes extremely large and prominent; ocelli translucent, much farther from each other than from the eyes and situated about on a line passing through center of eyes; face sharply emarginate before clypeus; clypeus longer than broad, distinctly set off from head, pubescent at extremity. Pronotum not greatly elevated, vertical above head, flat between horns, percurrent dorsal carina, dorsal line practically straight; humeral horns triquetrous, compressed, broad at base, tips sharp, almost flat above, extending almost directly outward, very slightly upward and backward; posterior process reaching just beyond internal angle of tegmina, stout at base, gradually acuminate, very slightly depressed in middle, tip faintly depressed, dorsal carina percurrent, a lateral carina on each side near margin. Scutellum distinct, pilose. Tegmina smoky hyaline, veins brown, a broad fuscous cloud at tip, base narrowly black and punctate; five apical and two discoidal areas. Hindwings iridescent hyaline, border clear and somewhat wrinkled. Undersurface of body black. Legs ferruginous brown; femora moderately swollen; tibiæ spined; tarsi flavous. Type, female.

Length, head to tip of tegmina, 7 mm.; width between extremities of horns, 3.6 mm.

PALAWAN, Puerto Princesa (*Baker*).

Genus **TRICENTRUS** Stål

Centrotus FABR. (in part); *Taloipa* BUCKT.

Tricentrus is a well-defined and easily distinguished genus. It is the only genus which shows both the suprahumeral horns and the spined posterior trochanters, the latter character appearing to be a very reliable and sufficient structure for diagnosis. These spines, or teeth, on the inner surface of the posterior trochanters are found also in the genera *Sipylus* and *Centrotoscelus*, but neither of these genera has suprahumeral horns. The function of such a structure is conjectural. The hind wings have three apical areas.

Four species have been described from the Philippines, all of which are recognizable from material at hand. These species, together with two herein described, may be separated as follows:

Key to the Philippine species of Tricentrus.

a^1. Suprahumeral horns at least twice as long as the distance between their bases ..... **convergens.**

*a*². Suprahumeral horns less than twice as long as the distance between their bases.
*b*¹. Suprahumeral horns not extending outward as far as extremities of humeral angles ..... attenuatus.
*b*². Suprahumeral horns projecting laterally beyond humeral angles.
*c*¹. Posterior process curving downward, much depressed at tip.. capreolus.
*c*². Posterior process straight or nearly so.
*d*¹. Veins of tegmina thickly pilose..... pilinervosus.
*d*². Veins of tegmina smooth or very sparsely pilose.
*e*¹. Areas of tegmina much wrinkled..... plicatus.
*e*². Areas of tegmina smooth..... fairmairei.

Tricentrus convergens Walk. Plate I, fig. 9, *a* and *b*.

Centrotus convergens Walk., List Hom. Brit. Mus. (1851), 623.
Tricentrus convergens Stål, Hem. Phil. (1870), 728; Dist., Fauna Brit. Ind. (1907), 4, 53; Funkh., Journ. Ent. & Zool. (1914), 6, 68.

Tricentus convergens is the type species of the genus, originally described from the Philippines by Walker and apparently not uncommon. It may be at once recognized by the very high and flattened, almost foliaceous, suprahumeral horns.

Ferruginous, finely punctate, sparingly pubescent, with sometimes a white tomentose area above and behind the eyes. Suprahumeral horns more than twice as long as the distance between their bases, projecting strongly forward and upward, subparallel, farther apart at their apices than at their bases, tips much rounded and flattened, not at all sharp; posterior process almost straight, tricarinate, dorsal carina high and sharp, extremity reaching just beyond internal angle of tegmina. Tegmina subhyaline, base brown and punctate. Undersurface of body dark brown. Legs ferruginous.

Length, from head to extremity of tegmen, 6 mm.; length of pronotal horns, 2 to 3 mm.; width between extremities of horns, 2 to 3 mm.

Philippines (Walker, Funkhouser); Luzon, Los Baños (*Baker*).

Tricentrus fairmairei Stål. Figs. 1 and 2.

Centrotus fairmairei Stål, Freg. Eug. Resa, Ins. (1859), 284.
Tricentrus fairmairei Stål, Analect. Hem. (1866), 387; Stål, Hem. Phil. (1870), 728; Dist., Fauna Brit. Ind. (1907), 4, 58; Funkh., Journ. Ent. & Zool. (1914), 6, 67.
Terentius fairmairei Buckt., Mon. Memb. (1903), 271.
Taloipa tinctoria Buckt., Trans. Linn. Soc. (1905), 9, 334, Pl. 22, fig. 4.

Tricentrus fairmairei is one of the abundant species of the genus as represented in the Islands. It may be recognized superficially by the reddish tinge over the entire body and tegmina.

Reddish brown, rather bright on posterior process and base of tegmina. Head almost twice as wide as long, obscurely and lightly punctate, irregularly pilose; clypeus projecting for half its length below inferior margin of face, margin slightly rimmed. Pronotum finely punctate, densely pubescent, almost perpendicular above head, strongly convex between horns; suprahumeral horns short, stout, triquetrous, extending almost directly outward, very slightly upward and backward, less than half as long as the distance between their bases; dorsal carina percurrent; posterior process slightly depressed at base, swollen before apex, dorsal carina high and sharp, extremity reaching internal angle of tegmina. Tegmina reddish smoky hyaline, base reddish brown or black and punctate. Legs and undersurface of body ferruginous brown.

The species shows a rather wide range of color, some specimens being much redder than others.

Length, 6 mm.; width between extremities of suprahumeral horns, 3.4 to 3.6 mm.

Bangalore (Buckton); Philippine Islands (Stål, Distant, Funkhouser); LUZON, Los Baños (*Baker*).

Tricentrus capreolus Walk. Plate II, fig. 10, *a* and *b*.

Centrotus capreolus WALK., List Hom. Brit. Mus. (1851), 627.
Tricentrus capreolus STÅL, Hem. Phil. (1870), 728.

A black, robust species, characterized by the rather long depressed posterior process. I have seen one specimen from the Islands, bearing duplicate No. 2650, collected at Mount Banahao by Professor Baker.

Black, finely and obsoletely punctured, sparsely covered with tawny pubescence. Pronotum much convex, projecting well above and before the suprahumeral horns as viewed from the side; suprahumeral horns short and rather blunt, not half as long as the distance between their bases; posterior process smooth, gradually curving, depressed at tip, extending well beyond internal angle of tegmina. Tegmina reddish hyaline, base black and punctate, veins brown, apical margin very slightly fuscous; a whitish patch on base of abdomen often showing through basal area. Undersurface of body black. Legs and feet very dark brown.

Length, 6.5 mm.; width between extremities of suprahumeral horns, 4.6 mm.

Philippine Islands (Walker, Stål); LUZON, Mount Banahao (*Baker*).

Tricentrus pilinervosus Funkh. Plate II, fig. 11, *a* and *b*.

Tricentrus pilinervosus FUNKH., Journ. Ent. & Zool. (1914), 6, 68, figs. 2 and 2a.

A black, stout species with rather widespreading, elevated suprahumeral horns. Near *T. decoratus* Dist., but differing particularly in the shape and position of the posterior process. Veins of tegmina very hairy.

Black, densely and coarsely punctate, sparsely pilose. Suprahumeral horns extending upward, outward, and slightly backward, as seen from above rounded before and almost straight behind. Posterior process narrow, acute, carinate, extending beyond internal angle of tegmina. Tegmina fuscous hyaline, base black and punctate, costal and apical margin clouded; veins each bearing two rows of short bristly hairs. Undersurface of body black. Legs dark ferruginous.

Length, including tegmina, 6 to 7 mm.; width between extremities of horns, 3.5 to 4 mm.

LUZON, Los Baños (*Baker*).

Tricentrus plicatus sp. nov. Plate II, fig. 12, *a* and *b*.

Near *T. fairmairei* Stål, but larger and different in color, in the form of the posterior process, the wrinkled condition of the tegmina, and the shape and position of the suprahumeral horns.

Black, punctured, pubescent; pronotum convex, lateral angles prominent, suprahumeral horns very slender, posterior process gradually acuminate, extending beyond internal angle of tegmina; tegmina smoky hyaline, much wrinkled, black and punctate at base.

Head wider than long, black, finely punctate, very densely pilose with yellow hairs; eyes large, reddish brown, extending beyond lateral margin of pronotum at base of head; ocelli opaque brown, almost equidistant from each other and from the eyes and situated slightly above a line passing through center of eyes; clypeus extending for half its length below the line of the face, sharply emarginate at base, lower margin slightly turned out at edge. Pronotum moderately convex, almost perpendicular above head, rounded between horns, black, finely and densely punctate, thickly pilose with long golden hairs; dorsal carina obsolete before horns, percurrent behind them; humeral angles prominent and auriculate; suprahumeral horns arising from extreme dorsolateral margin of pronotum, very thin as seen from the front, distance between their bases almost twice as great as length of horn, horns extending strongly outward, upward, and backward,

short, acute, somewhat flattened dorsoventrally, upper surface of horn bearing distinct central carina; scutellum distinct, longer than broad; posterior process slender, triquetrous, slightly depressed in middle, lateral margin extended before middle, tip acute, reaching well beyond internal angle of tegmina. Tegmina smoky hyaline, without markings, base black and punctate, entire surface much wrinkled, veins distinct and somewhat punctate along margins with occasional scattered hairs. Undersurface of body black, sides of abdomen and of meso- and metathorax densely pubescent. Femora brown-black and swollen; hind trochanters armed with strong teeth on inner surface; tibiæ flattened, flavous above, very light yellow below, margins bristled; small yellow nodule in joint between femur and tibia; tarsi ferruginous; claws brown. Type, female.

The type specimen bears Baker's duplicate No. 3116.

Length to extremity of tegmen, 7 mm.; width between extremities of suprahumeral horns, 4.8 mm.

MINDANAO, Dapitan (*Baker*).

Tricentrus attenuatus sp. nov. Plate II, fig. 13, *a* and *b*.

Near *T. gibbosulus* Walk., but different in color, in shape and position of suprahumeral horns, and in structure of posterior process.

Testaceous, becoming light brown posteriorly, broad white tomentose patch on sides of meso- and metathorax; suprahumeral horns broad and flattened, not extending outward as far as humeral angles below them; posterior process short, sharp, tectiform, barely reaching the internal angles of tegmina; undersurface of body black; bases of femora very dark brown; extremities of femora, entire tibiæ, tarsi, and claws ferruginous-ochraceous. Size small.

Head broader than long, almost black, very densely and evenly pilose with silvery hairs; eyes large, very prominent, ochraceous, mottled with brown; ocelli pearly, somewhat farther from each other than from the eyes and situated slightly above a line passing through center of eyes; lower margin of face wavy; clypeus extending well below lower margin of face. Pronotum moderately convex, dark brown before shading to lighter behind, uniformly pilose, finely punctate; humeral angles prominent; suprahumeral horns short, sharp, flattened dorsoventrally, not extending outward as far as extremities of humeral angles, projecting outward, upward, and strongly curving backward, anterior margin broadly rounded, posterior margin almost straight, not carinate above; posterior process tectiform, sharply

carinate above, impinging on inner margin of tegmina for entire length below, reaching barely to internal angle of tegmina. Tegmina fuscous hyaline, slightly wrinkled, base dark brown and punctate, veins distinct and brown, narrow brown fascia at extreme exterior tip. Sides of meso- and metathorax directly behind eyes covered with snowy white tomentose patch. Undersurface of body black, slightly pubescent. Femora very dark brown, except extremities which are ferruginous; internal margin of hind trochanters strongly armed with teeth, tibiæ simple and ferruginous; tarsi and claws yellow-ferruginous. Type, male.

Length, 4.5 mm.; width between extremities of horns, 1.9 mm.

MINDANAO, Butuan (*Baker*).

Genus CENTROTUS Fabricius

The advisability of giving the genus *Centrotus* a place in this study is extremely doubtful. It is included entirely on the strength of the descriptions of three species from the Philippines which have been assigned to this genus but which have never been recognized since their original publication.

The genus is one of the oldest and best known of the genera of the Membracidæ, being established by Fabricius in his Systema Rhyngotorum in 1803, and has contained at various times a large number of species now removed to other genera. It appears probable that the species here given will be likewise removed if they are discovered, since the characters of *Centrotus* are much less inclusive than formerly.

The genus as now limited may be recognized by the shape of the posterior process which is distinctly separate and somewhat remote from the scutellum, somewhat extended and widened beneath, then rather abruptly becoming slender, the tip often touching the tegmina. No spines are present on the hind trochanters; the hind wings have three apical areas; the suprahumeral horns are always well developed.

The following must be considered as lost species until examination of type material or careful study of long series of specimens makes their recognition possible.

Centrotus magellani Fairm.

Centrotus magellani FAIRM., Rev. Memb. (1846), 512; WALK., List Hom. Brit. Mus. (1851), 604.

A translation of Fairmaire's original description is as follows:

12. *C. Magellani.**—Lefebv. Coll. Manilla. Long. 0,006. (Fuscous, elytra

hyaline, base and apex punctate black, anterior horns reversed, compressed, recurved.)

Body and prothorax brown; horns compressed, directed forward, their extremities recurved; posterior spine shorter than abdomen; sides of breast white; on the front of the prothorax two lines between the horns and the head of an indistinct gray; legs ferruginous, knees clearer; elytra hyaline, with a brown spot at the base and at the extremity.

Centrotus dilatatus Walk.

Centrotus dilatatus WALK., List Hom. Brit. Mus. (1851), 630.

Centrotus dilatatus was described from a single specimen of which the head was missing. The description lacks the details necessary for present generic determination and is as follows:

Brown, clothed with dingy tawny hairs; head wanting; fore-chest very broad, indistinctly ridged, low in front; shoulders flat, conical, very prominent; horns above compressed, angular, extremely short; hind appendage very short, triangular, keeled, impressed on each side near the base, not extending much beyond the base of the abdomen; fore-wings grayish, ferruginous at the base; veins ferruginous, nodose. Length of the body 1½ line; of the wings 3 lines.

a. Philippine Islands. From Mr. Cuming's collection.

It should be noted that the length of the wings as given above was used by Walker to refer to the distance between the tips of the tegmina when spread at right angles to the body. The measurements as changed to millimeters then become: Length, 3.16 mm.; width of outstretched wings, 6.33 mm.

The description suggests a small *Tricentrus*, but since the recognition of genera and species in this group depends largely on the shape of the clypeus, the relative position of the ocelli and the eyes, the apical areas of the hindwings, and the structure of the scutellum the description of a headless specimen in the discussion of which neither the scutellum nor the hindwings are mentioned lends itself poorly to purposes of identification.

Centrotus orcus Buckt.

Centrotus orcus BUCKT., Mon. Memb. (1903), 247, Pl. 60, figs. 7, 7a, 7b.

No data concerning *Centrotus orcus* are available, except Buckton's description which is here quoted verbatim:

General form robust and broad between the shoulders. Suprahumerals short, connate and stout. Pronotum narrowed to a short almost stylate posterior horn. Colour sordid olive-green, with ochreous tips to the tegmina. Frons and metopidium hirsute. Legs olive. Tegmina with five distinct apical and three discoidal areas.

Size, 5 x 3 mm. Habitat—Philippine Isles.

Genus SIPYLUS Stål

Centrotus FABR. (in part).

Sipylus is a genus peculiar in having the body very broadly triangular, the width between the humeral angles being usually as great as the extreme length of the pronotum. The other characters assigned by Stål to the genus may be deduced from his key [21] to be as follows: Posterior process present; tibiæ simple; sides of breast unarmed; hindwings with three apical areas; posterior process not distant from scutellum; body obtriangular; suprahumeral horns absent; lateral angles prominent; posterior process short and depressed; posterior trochanters armed with spines on internal margin.

The genus is very distinct in general appearance and not difficult to recognize. Only two species, both from the Philippines, have been assigned to the genus. These may be separated as follows:

Key to the species of Sipylus.

a^1. Veins of tegmina without prominent nodules..... crassulus.
a^2. Veins of tegmina with prominent nodules..... nodipennis.

Sipylus crassulus Stål. Plate II, fig. 14.

Centrotus crassulus STÅL, Freg. Eug. Resa, Ins. (1859), 285.
Sipylus crassulus STÅL, Analect. Hem. (1866), 387. STÅL, Hem. Phil. (1870), 728. BUCKT., Mon. Memb. (1903), 270.

If I am determining *S. crassulus* correctly, it is somewhat variable in size and coloration, and the sexes differ in the length of the auricular humeral angles and in the appearance of the tegmina.

The female is ferruginous brown, punctate, and covered with fine, white, silky pubescence; the humeral angles are very long, almost half as long as the distance between their bases; the pronotum is very convex; the posterior process short, robust, and suddenly acute; the tegmina is smoky, ferruginous, and semiopaque, and more or less wrinkled and with brown punctate base; the legs and undersurface of body are ferruginous.

Length, 5 to 6 mm.; width, 4.5 to 5 mm.

In the male the color is much darker, almost black anteriorly; humeral angles shorter; tegmina almost clear hyaline with black base and white tomentose patch at base of abdomen showing through; undersurface of body black; legs dark brown.

Length, 4 to 5 mm.; width, 3.5 to 4 mm.

Philippines (Stål); LUZON, Mount Banahao (*Baker*).

[21] Hem. Afr. (1866), 4, 88.

Sipylus nodipennis Funkh. Plate II, fig. 15.

Sipylus nodipennis FUNKH., Journ. Ent. & Zool. (1914), 6, 72, fig. 5.

Sipylus nodipennis is easily recognized by the nodules on the veins of the tegmina and the thick yellow pubescence over the whole surface of the body.

The body is subtriangular; the pronotum slightly wider between the humeral angles than the distance from the anterior convexity to the extremity of the posterior process. The tegmina are broad, rounded at apex, subhyaline and punctate at base, and characterized by the presence of the tubercles on the veins. The posterior trochanters are strongly armed with teeth.

Length, female, 3.5 to 4 mm.; male, 3 mm.; width at humeral angles, female, 3.5 mm.; male, 2.75 mm.

LUZON, Los Baños (*Baker*).

Genus CENTROTOSCELUS Funkhouser

The genus *Centrotoscelus* was erected [22] for the reception of its one species. This genus is peculiar in having no suprahumeral horns and yet having strong teeth on the posterior trochanters. It is entirely distinct from *Sipylus*, though falling near it in an artificial key. The genus seems naturally closely related to *Tricentrus*, from which it may be distinguished by the absence of the suprahumeral horns.

The body is long and comparatively slender; scutellum distinct; posterior process short, impinging on scutellum and tegmina; hind wings with three apical areas.

Centrotoscelus typus Funkh. Plate II, fig. 16, *a* and *b*.

Centrotoscelus typus FUNKH., Journ. Ent. & Zool. (1914), 6, 73, figs. 3 and 4.

Ferruginous brown; pronotum finely and densely punctate and sparsely pilose. Posterior process long, narrow, gradually acuminate, slightly depressed at tip, extending somewhat beyond internal angles of tegmina; median ridge distinct at apex, but becoming obsolete at metopidium. Tegmina subhyaline, brown and punctate at base, a very narrow brown transverse stripe behind middle and a faint brown cloud at apex. Legs ferruginous; tarsi yellowish; claws black. Segments of abdomen margined with white above.

Length, female, 5 mm.; male, 4.33 mm.; width, female, 2.5 mm.; male, 2.2 mm.

LUZON, Los Baños (*Baker*).

[22] *Journ. Ent. & Zool.* (1914), 6, 72.

Genus **EBHUL** Distant

Centrotus FABR. (in part); *Leptobelus* STÅL (in part).

The genus *Ebhul* was erected by Distant,[23] with *E. varius* Walk. as the type, to include those species of the division *Gargararia* in which the posterior pronotal process is strongly, sinuately waved.

Other generic characters given by the author are the convexly gibbous, strongly ridged pronotum, the scutellum which is almost as broad as long, the face longitudinally sulcate with the beak reaching the posterior coxæ, and the broad, ample tegmina crossed by a series of transverse veins at its apical area.

To this genus must be assigned the following new species:

Ebhul carinatus sp. nov. Plate II, fig. 17, *a* and *b*.

Ferruginous and black, distinctly marked, punctate, pubescent; anterior pronotum high, entire pronotum sharply carinate; posterior process uniform in size from base to apex, strongly sinuate, extending beyond internal angle of tegmina; tegmina strikingly marked with black, brown, white, and hyaline; undersurface of body almost black; legs ferruginous.

Head including clypeus much longer than wide, center of base much higher than upper margin of eyes, very finely and obsoletely punctate, densely pubescent with white hairs; eyes large, prominent, brown mottled with black; ocelli pearly, semitransparent, much farther from each other than from the eyes and situated about on an imaginary line passing through center of eyes; clypeus set off by distinct suture from head, extending far below the lower margin of the face, subtriangular at base, rather narrow for the rest of its length and truncate at apex. Pronotum rising high above head, finely punctate and pubescent with white hairs, dorsal carina high, sharp, and percurrent; on each side above humeral angles a short, sharp, elevated carina suggesting the beginning of suprahumeral horns; lateral angles prominent; no suprahumeral horns; scutellum distinct, exposed by the elevation of the posterior process above it; posterior process uniform in size, brown at base, white in middle and black at extremity, a deep depression just behind crest of pronotum, another just behind apex of scutellum, the lower line following these curves to form decided sinuosities, tip subacute, triquetrous, extending beyond internal angle of tegmina. Tegmina brown, pubescent and punctate at base, this area followed by a tringular

[23] Fauna of British India—Rhynchota (1907), 4, 59.

black fascia with base next to posterior process, next to this a triangular white area narrowest above, beyond this a second broad, black fascia extending almost to tip, which is subhyaline. Undersurface of body almost black anteriorly with white pubescence; abdomen fuscous ferruginous. Legs simple, ferruginous; tarsi somewhat darker. Type, male.

Length, 5 mm.; maximum width, 2 mm.

MINDANAO, Butuan (*Baker*).

Genus GARGARA Amyot and Serville

Membracis FABR. (in part); *Centrotus* FABR. (in part); *Oxyrhachis* GERM. (in part); *Smilia* GERM. (in part); *Maerops* BUCKT.

Gargara is the most richly represented, thus far, of all the genera of the Membracidæ found in the Philippines. Twelve species are here recognized and future collecting will doubtless yield many more. The genus has a wide range, the type species (*G. genistæ* Fabr.) being found in Europe, while many forms have been recorded from Asia, Africa, and the East Indies.

The species are for the most part small and without the striking pronotal developments so common to the family. From the small size and commonplace appearance of its species the genus was named by its authors [24] from the fancied resemblance to a seed.

The pronotal horns are lacking, the posterior trochanters unarmed, the pronotum usually smooth, and the posterior process straight.

The following key, while based on characters entirely artificial, will, it is believed, enable the student to locate all of the species known to the Islands to date. However, any dichotomous table is more or less unsatisfactory, and the full descriptions must be consulted for final recognition of the species.

Key to the Philippine species of Gargara.

a^1. Pronotum entirely black or very dark.

b^1. Median dorsal ridge distinct and prominent on anterior pronotum as seen from front.

c^1. Tips of tegmina hyaline or nearly so..... luconica.

c^2. Tips of tegmina opaque or concolorous with rest of tegmina. varicolor.

b^2. Median dorsal ridge not present on anterior pronotum or if present very obsolete and faint.

c^1. Posterior process extending beyond tip of abdomen; large trifoliate spot on tegmen..... trifoliata.

[24] Histoire Naturelle des Insectes—Hemiptères (1843), 527.

c^2. Posterior process not reaching tip of abdomen.
d^1. Tegmina entirely hyaline, except small black punctate area at base ..... nigrocarinata.
d^2. Tegmina more or less colored and opaque.
e^1. Front of head densely, posterior process slightly, pubescent. nigrofasciata.
e^2. Front of head not densely, posterior process not at all, pubescent.
f^1. Size very small, apical fourth of tegmina entirely hyaline. pygmaea.
f^2. Size larger, apical fourth of tegmina not hyaline.... patruelis.
a^2. Pronotum yellow, or very light brown at least in the females.
b^1. Veins of tegmina bearing nodules..... tuberculata.
b^2. Veins of tegmina not bearing nodules.
c^1. Tegmina entirely opaque.
d^1. Tegmina uniform yellow..... luteipennis.
d^2. Tegmina strongly marked with dark brown and white. pulchripennis.
c^2. Tegmina hyaline at least for apical four fifths.
d^1. Head much deflexed; pronotum concolorous or nearly so; tegmina clear ..... brunnea.
d^2. Head almost perpendicular; pronotum marked with brown and yellow; tegmina iridescent..... nitidipennis.

Gargara luconica Fairm.

Membracis luconica FAIRM., Rev. Memb. (1846), 255.
Enchenopa luconica WALK., List Hom. Brit. Mus. (1851), 484.
Gargara luconica STÅL, Hem. Phil. (1870), 728.

A small, black, rather robust species with carinate posterior process and dull, opaque tegmina with hyaline tips.

Head broader than long, black, finely punctate, sparsely pilose with silvery hairs; eyes almost white with brown fascia; ocelli pearly, farther from each other than from the eyes and situated slightly above a line passing through center of eyes; clypeus strongly deflexed and extending far below margin of face. Pronotum uniform black, finely punctate, and sparingly pubescent with silvery hairs; median carina percurrent from head to apex of posterior process; humeral angles not prominent; posterior process sharply carinate, tectiform, extending just beyond internal angle of tegmina. Tegmina opaque, except at tips, which are yellowish hyaline; basal and costal areas black and punctate; veins prominent and bearing scattered silvery hairs. Undersurface of body black; legs very dark ferruginous brown, almost black; tarsi very light brown; claws ferruginous.

Length, 3 mm.; maximum width, 1.7 mm.

Philippine Islands (Fairmaire); NEGROS, Cuernos Mountains; MINDANAO, Dapitan; LUZON, Mount Maquiling (*Baker*).

Gargara pygmaea Walk.

Centrotus pygmaeus WALK., List Hom. Brit. Mus. (1851), 630.
Gargara pygmaea BANKS, Phil. Journ. Sci., Sec. D (1910), 5, 48.

I have seen the material which C. S. Banks determined as *G. pygmaea* and believe this determination to be correct. The specimens do not agree with the original description as well as might be desired in some minor respects, but on the whole they answer Walker's description. The specimens which I have seen, however, are all decidedly black, with only a tinge of brown or ferruginous around the anterior and ventral regions, while the original description would have them brown.

This species is very near *G. luconica* Fairm., as I determine that species, but is smaller, and the tegmina are shining black and not dull opaque. In both species the tips of the tegmina are more or less hyaline.

The specimens bear Professor Baker's duplicate Nos. 3951 and 2656.

Very small, black, and shining; posterior process straight and sharp; tegmina glistening black for basal four fifths with tips hyaline.

Head about as long as wide, finely and densely punctate, not pubescent; eyes red-brown; ocelli very small, much farther from each other than from the eyes and situated above a line passing through center of eyes; front of head not greatly deflexed, almost perpendicular, front convex; clypeus extending below margin of face. Pronotum strongly sloping backward from head, black, finely punctate, very sparsely pilose; median dorsal carina distinct behind humeral angles, but obsolete and only obscurely visible before them; humeral angles not prominent; posterior process subtriquetrous hardly reaching internal angle of tegmina. Tegmina glistening, very dark brown or black for basal four fifths, apex hyaline; base black and punctate; veins prominent. Legs and undersurface of body black; tarsi flavous.

Length, 2.5 mm.; maximum width, 1.2 mm.

Philippine Islands (Walker, Banks); PALAWAN, Puerto Princesa; LUZON, Mount Banahao (*Baker*).

Gargara patruelis Stål.

Centrotus patruelis STÅL, Freg. Eug. Resa, Ins. (1859), 285.
Gargara patruelis STÅL, Hem. Phil. (1870), 728.

Rather large, black, robust, without percurrent dorsal carina. Tegmina translucent smoky ferruginous with base and large part of costal area black and punctured. Posterior process strong, sharp, somewhat decurved.

Head wider than long, black, sparingly pubescent with golden hairs; eyes mottled brown; ocelli pearly, not prominent, farther from each other than from the eyes and situated above a line passing through center of eyes; clypeus short, wider than long, continuing irregularly the sinuate outline of the face. Pronotum black, punctate, sparsely pilose, sloping gradually backward above the head; lateral angles obtuse, not prominent; posterior process strong, gradually acuminate, decurved and turning downward at tip, tip extending beyond internal angles of tegmina. Tegmina smoky hyaline, except the black and punctate base which extends down into the costal area; veins prominent, slightly elevated, and brown. Undersurface of body black. Femora and tibiæ black; tarsi flavous.

Length, 4 mm.; maximum width, 2 mm.

Philippine Islands (Stål); LUZON, Malinao, Tayabas, Mount Banahao (*Baker*).

Gargara varicolor Stål. Plate II, fig. 18.

Gargara varicolor STÅL, Hem. Phil. (1870), 728; FUNKH., Journ. Ent. & Zool. (1914), 6, 69.

Gargara varicolor is closely related to *G. patruelis*, but is smaller and differs particularly in the presence of a strong anterior ridge extending over the metopidium and in the markings of the tegmina. The species, as I determine it, varies considerably in size and color, but the tegminal markings appear to be constant. Stål recognizes three varieties, "a," "b," and "c"—the first with pronotum black; the second black with median and lateral stripe; the third ferruginous with black spots on posterior process. Of these I have seen only the first, but in the specimens at hand the color ranges from black to light ferruginous.

Stål describes the tegmina as "vitreis, pone medium fascia fuscescente notatis, pone fasciam subvinaceis, basi punctulatis," and I find an apparently trustworthy character in the fact that the fuscous marking extends into the black punctate base in a wedge-shaped tooth.

The pronotum is sparingly pubescent with yellowish hairs and is very densely and finely punctate. The posterior process is somewhat depressed in the middle and at the tip.

Gargara varicolor seems to be one of the commonest of the Philippine membracids, and many specimens have been studied.

Length, 4.5 mm.; maximum width, 2 mm.

Philippine Islands (Stål); LUZON, Los Baños, Mount Maquiling, Mount Banahao (*Baker*).

Gargara pulchripennis Stål.

Gargara pulchripennis STÅL, Hem. Phil. (1870), 729; FUNKH., Journ. Ent. & Zool. (1914), 6, 70.

Gargara pulchripennis may be recognized at once by the beautiful dark brown and white markings of the tegmina. These markings are rather irregular and confluent, but usually show a distinct cross stripe of white near the base, followed by checkered areas of small brown and white patches. The base of the tegmina is ferruginous and pubescent, the tip narrowly dark brown with a white stripe just before it. The entire tegmen is opaque.

The posterior process is rather short, not reaching the interior angle of the tegmina, slightly depressed at base, and bluntly tectiform at tip. The scutellum is very distinct.

Length, 4 mm.; maximum width, 2 mm.

Philippine Islands (Stål); MINDANAO, Butuan; LUZON, Mount Maquiling, Los Baños (*Baker*).

Gargara nigrofasciata Stål.

Gargara nigrofasciata STÅL, Hem. Phil. (1870), 729; FUNKH., Journ. Ent. & Zool. (1914), 6, 70; FUNKH., Journ. N. Y. Ent. Soc. (1914), 22, 235.

Gargara nigrofasciata is apparently variable, showing a gradation in tegminal markings from the broad-striped form described by Stål to specimens in which the stripe is narrowed to a very narrow ferruginous line. There seem to be no specific differences in the series.

Usually the median dorsal carina is obsolete or visible only upon the posterior process. This process is rather thin and very sharp, reaching the internal angle of the tegmina. The pronotum is black, densely punctate, but not pubescent. The eyes are very prominent and reddish.

The description of a single individual would be misleading, owing to the variety of tegminal markings, and since these markings were used as the principal character in erecting the species, a long series must be studied before accurate specific limits can be established.

Length, 3.5 mm.; maximum width, 1.5 mm.

Philippine Islands (Stål); LUZON, Mount Maquiling, Mount Banahao; MINDANAO, Iligan, Dapitan (*Baker*).

Gargara tuberculata Funkh.

Gargara tuberculata FUNKH., Journ. Ent. & Zool. (1914), 6, 70, fig. 6.

Gargara tuberculata may be recognized by the prominent tubercles upon the veins of the tegmina and upon the pronotum.

Entirely lemon yellow with white lines extending over the shoulders. Head yellow. Posterior process set off from thorax by deep notch on each side. Tegmina yellow, opaque; base punctate and pubescent; veins nodulose. Undersurface of body white tomentose. Legs yellow.

Length, 4 to 4.5 mm.; maximum width, 2 to 2.5 mm.

LUZON, Los Baños (*Baker*).

Gargara luteipennis Funkh.

Gargara luteipennis FUNKH., Journ. Ent. & Zool. (1914), 6, 71, fig. 7.

Gargara luteipennis is of about the size of *G. tuberculata* and resembles it in color, but lacks the granules on tegmina and pronotum. The tegmina are very characteristic, being a flat yellow, not shining or glistening, and with broad, well-marked veins.

Entirely light yellow. Pronotum finely punctate, but not pubescent. Posterior process acuminate, extending as far as the internal angles of the tegmina.

Length, 4 mm.; maximum width, 2.5 mm.

LUZON, Los Baños (*Baker*).

The single type specimen of this species bears Professor Baker's duplicate No. 954.

Gargara nitidipennis Funkh.

Gargara nitidipennis FUNKH., Journ. Ent. & Zool. (1914), 6, 71.

The type specimens of *G. nitidipennis* were rather small, the type measuring 3.5 mm. and the allotype 3.33 mm. Material has since been received which includes specimens 5 mm. in length, so that the insect appears to be somewhat variable as to size.

The specific characters, however, are very constant, especially the extremely iridescent tegmina and the brown- and yellow-marked pronotum. The body is yellow with broad brown fasciæ on anterior metopidium and apex of posterior process. The latter is strong and heavy, slightly depressed at tip, and reaching to the internal angles of the tegmina. The undersurface of the body is ferruginous brown, the legs often being lighter.

Length, 3.5 to 5 mm.; maximum width, 1.3 to 2.2 mm.

LUZON, Los Baños, Mount Maquiling, Mount Banahao; MINDANAO, Iligan, Dapitan; Butuan (*Baker*).

Gargara nigrocarinata Funkh.

Gargara nigrocarinata FUNKH., Journ. N. Y. Ent. Soc. (1914), 22, 234, fig. 1.

Gargara nigrocarinata is a small black species, recognizable by the high ridge on the posterior process and the delicate hyaline tegmina with their sharply marked black bases.

The pronotum is finely punctate and bears short, yellowish or silvery hairs; obtusely rounded in front with prominent lateral angles; median carina obsolete before humeral angles, but well developed posteriorly and becoming high and sharp on posterior process. Head longer than wide; eyes prominent, usually reddish in the females and pearly in the males.

Length, 3 to 3.5 mm.; maximum width, 1.5 to 1.8 mm.

LUZON, Los Baños, Mount Maquiling (*Baker*).

Gargara brunnea Funkh.

Gargara brunnea FUNKH., Journ. N. Y. Ent. Soc. (1914), 22, 235, fig. 2.

Robust, brown, punctate, pubescent. Head broader than long, inflexed. Pronotum low and broad anteriorly; humeral angles obtuse; posterior process long, sloping downward, extending slightly beyond internal angles of tegmina, apex carinate. Tegmina opaque hyaline, except at base, which is brown and punctate.

Length, 3.5 to 4 mm.; maximum width, 2 to 2.3 mm.

LUZON, Mount Maquiling (*Baker*).

Gargara trifoliata Funkh. Plate II, fig. 19.

Gargara trifoliata FUNKH., Journ. N. Y. Ent. Soc. (1914), 22, 235, fig. 3.

The largest and most distinct of all the species of this genus hitherto described from the Islands is *Gargara trifoliata*. It should be easily recognized by the large trifoliate white marking on each tegmen and by the very long, decurved posterior process.

Black, punctate, head and anterior pronotum pubescent. Posterior process heavy and strongly tricarinate, extending to a point more than halfway between the internal angle and the tip of the tegmen. Tegmina black for basal two thirds, on this black area the characteristic clover-leaf hyaline spot, apical third orange-yellow, tip bearing brown band.

Length, 8 mm.; maximum width, 4 mm.

LUZON, Mount Maquiling (*Baker*).

Genus CRYPTASPIDIA Stål

The genus *Cryptaspidia,* although clearly set off from the foregoing by natural characters, is rather hard to delimit by the use of artificial ones. It can best be recognized by its general appearance and differs greatly from *Gargara* in the size of its species and the difference in the structure shown in the pronotal process.

All of the species assigned to the genus are from the Philippines and were described by Stål in his Hemiptera insularum Philippinarum in 1870.

The insects are long-bodied, rather slender, with very thin, convex metopidia and gradually acuminate posterior processes. The tegmina show two discoidal cells, and this character is given by Stål as generic, but is not in itself sufficient. The hind wings have three apical areas, and the posterior trochanters are without spines.

Four species are known and may be separated as follows:

Key to the species of Cryptaspidia.

a^1. Median dorsal carina entirely lacking ..... pubera.
a^2. Median dorsal carina visible although sometimes faint.
  b^1. Size small, not over 5 mm. in length ..... tagalica.
  b^2. Size large, not less than 6 mm. in length.
    c^1. Head strongly convex ..... impressa.
    c^2. Head not strongly convex ..... obtusiceps.

Cryptaspidia pubera Stål. Plate II, fig. 20.

Cryptaspidia pubera STÅL, Hem. Phil. (1870), 729; BUCKT., Mon. Memb. (1903), 267; FUNKH., Journ. Ent. & Zool. (1914), 6, 69.

Black, finely and densely punctate, more or less pubescent with flavous hairs. No dorsal carina. Humeral angles obtuse and not prominent. Tegmina ferruginous, somewhat pubescent.

Head entirely covered with matted golden hairs; ocelli pearly, farther from each other than from the eyes, situated above a line passing through center of eyes. Pronotum very convex anteriorly, sparsely pubescent, gradually sloping into posterior process which is rather short, thick, and not carinate. Tegmina rough, somewhat wrinkled, fuscous ferruginous and sparingly pubescent; base black and punctate, this area extending down upon the costal margin. Undersurface of body strongly pubescent. Legs and feet uniformly flavous.

Stål described the tegmina as fuscous hyaline, but in all of the specimens studied they have inclined to opaqueness, especially when seen against the hind wing and abdomen.

Length, 5.5 mm.; maximum width, 2.7 mm.

Philippine Islands (Stål); LUZON, Los Baños, Mount Maquiling (*Baker*).

Cryptaspidia tagalica Stål.

Cryptaspidia tagalica STÅL, Hem. Phil. (1870), 729; FUNKH., Journ. Ent. & Zool. (1914), 6, 69.

Cryptaspidia tagalica is the smallest species of the genus thus far described. The specimens studied agree well in size and color and vary only slightly in tegminal markings.

Black, coarsely and densely punctate, the punctures being much larger and farther apart on the posterior process than on the metopidium. Head somewhat broader than long, punctate, pilose with long yellowish hairs; ocelli distinct, transparent, much farther from each other than from the eyes and situated well above a line passing through center of eyes; clypeus broader than long, only slightly deflexed, pilose; anterior margin of head rounded between the eyes. Pronotum almost perpendicular above the head, very obtusely convex, sparingly pilose over lateral angles; lateral angles rounded, not prominent; posterior process not set off from anterior pronotum by a hollowing out above scutellum, but continuing to a gradual point from the humeral angles, apex acute, very slightly depressed. Tegmina wine-colored, base black and punctate, a rather narrow fuscous band across middle, another near tip, apex hyaline. Undersurface of body and femora black; tibiæ and tarsi ferruginous.

Length, 4.5 mm.; maximum width, 2 mm.

Philippine Islands (Stål); LUZON, Los Baños, Mount Maquiling (*Baker*).

I have seen specimens close to this species, but apparently distinct, which I would not care to describe as new from the limited material. It may be that the species varies more greatly than the above diagnosis would imply.

Cryptaspidia impressa Stål.

Cryptaspidia impressa STÅL, Hem. Phil. (1870), 730; BUCKT., Mon. Memb. (1903), 267.

Cryptaspidia impressa is very close to *C. pubera*, but is larger and shows a distinct carina on the posterior process.

Black, punctate, and pubescent with grayish hairs. Head broader than long, very convex between the eyes, pubescent; ocelli opalescent, farther from each other than from the eyes; eyes prominent; clypeus strongly pilose. Pronotum rounded anteriorly with faint median carina on metopidium which be-

comes strong and sharp on posterior process. Tegmina fuscous hyaline, marked with more or less irregular fascia of ferruginous.

Length, 6 to 7 mm.; maximum width, 3 to 3.5 mm.

Philippine Islands (Stål).

Cryptaspidia obtusiceps Stål.

Cryptaspidia obtusiceps STÅL, Hem. Phil. (1870), 730.

Cryptaspidia obtusiceps is known to me only from the original description, which follows. It is apparently very close to *C. impressa* and is to be distinguished chiefly by the less convex head as suggested in the key. Stål describes it after *C. impressa* as follows:

Praecedenti simillima et maxime affinis, differt capite anterius inter oculos sensim obtuse rotundato, fronte obtusissima, deorsum haud prominula. ♀ Long. 6-7, lat. 3-3½ mill.

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ILLUSTRATIONS

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FIG. 1. *Centrochares horrificus* Westw.
2. *Pyrgonota bifoliata* Westw.
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18. *Gargara varicolor* Stål.
19. *Gargara trifoliata* Funkh.
20. Tegmen of *Cryptaspidia pubera* Stål.

TEXT FIGURES

FIG. 1. Fore and hind wings of *Tricentrus fairmairei* Stål. *a*, discoidal cells; *b*, apical cells; *c*, internal angle.
2. Front and lateral outline of *Tricentrus fairmairei* Stål. *a*, humeral angles; *b*, suprahumeral horns; *c*, metopidium; *d*, clypeus, *e*, posterior process.
3. Armed posterior trochanters.

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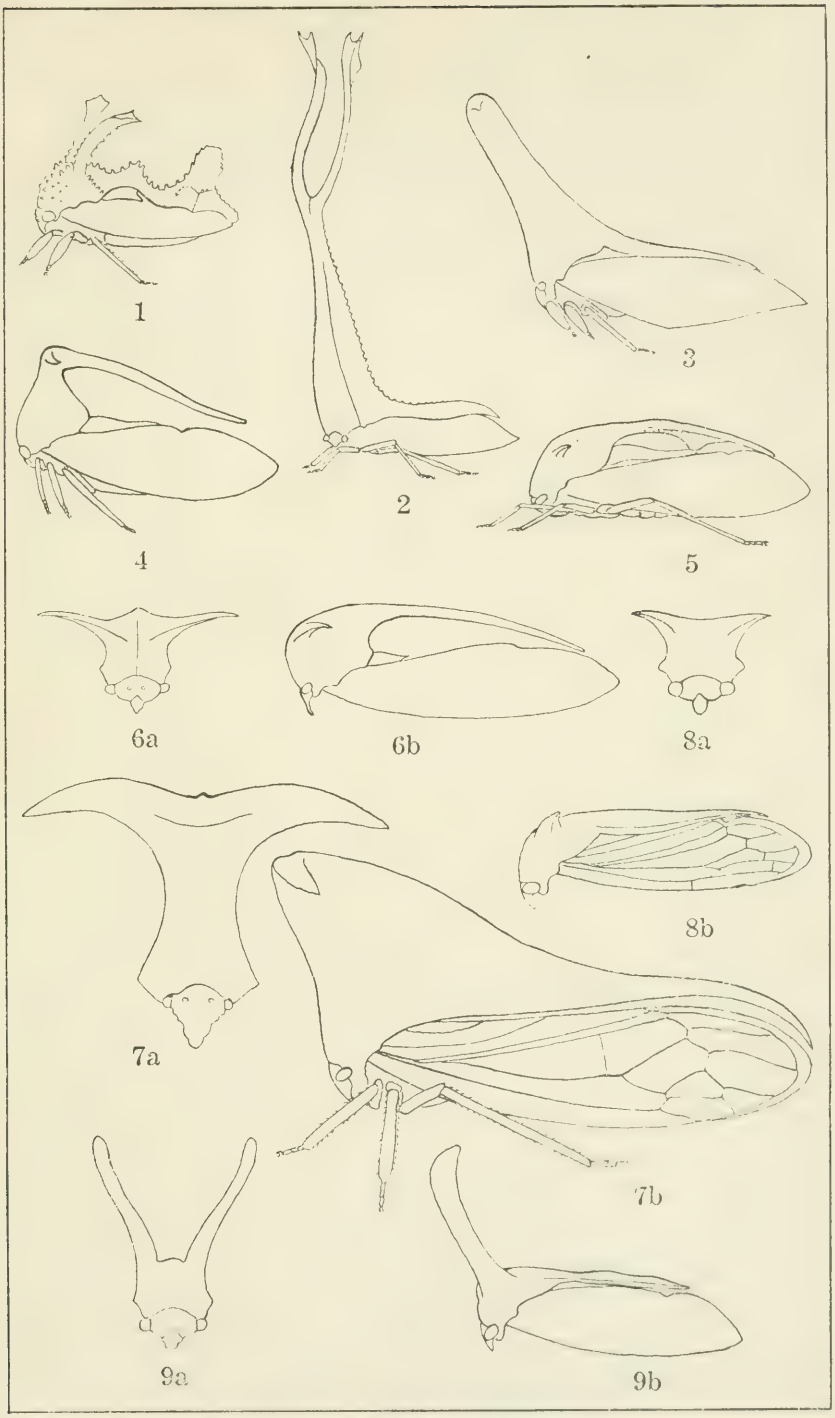
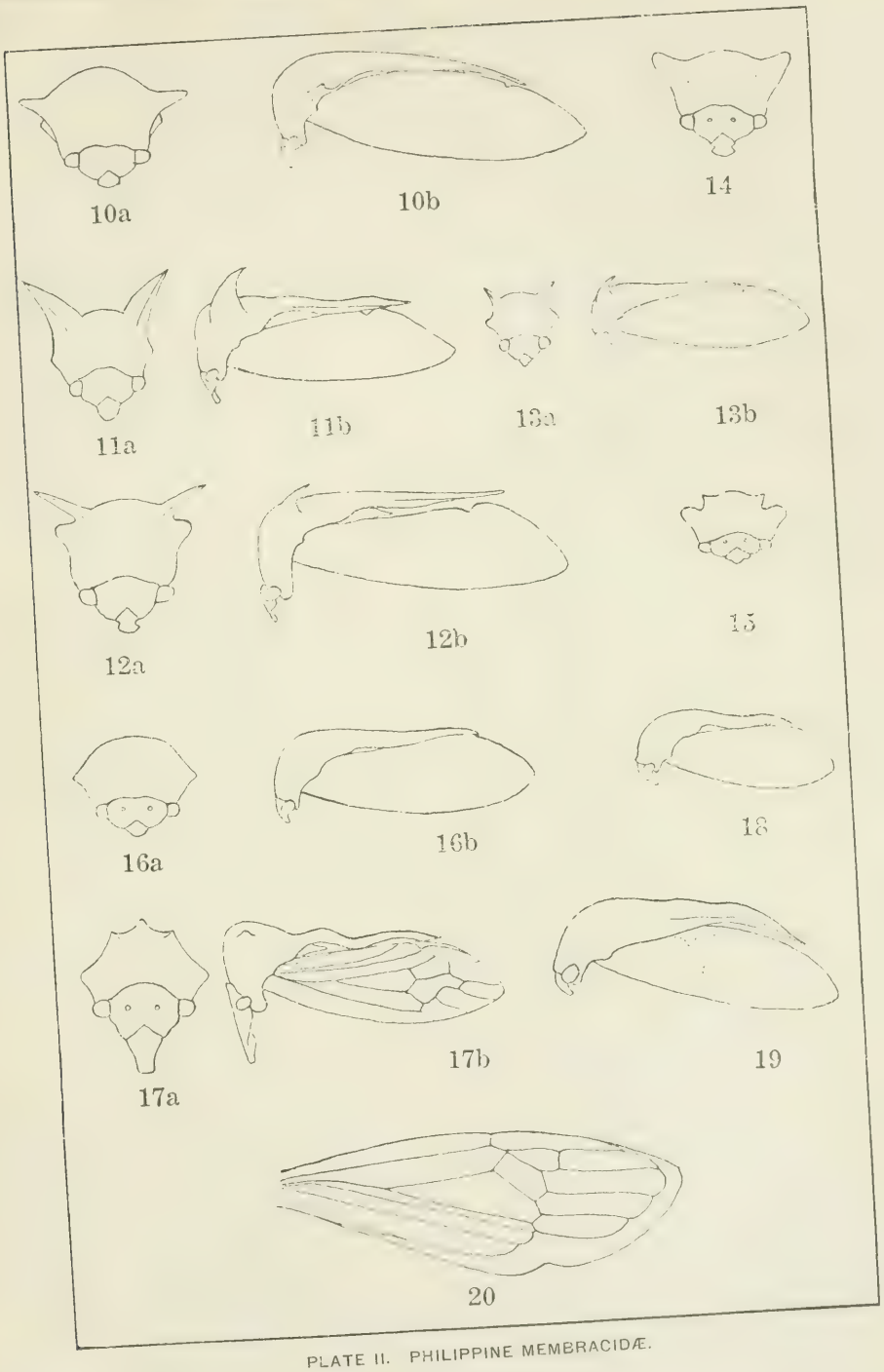


PLATE I. PHILIPPINE MEMBRACIDÆ.



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